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DISEASES OF CHILDREN.

DISPATCHES OF CHILDREN.

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THE
DISEASES OF CHILDREN.

BY

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TO

ALEXANDER FERRIER, ESQ.

WITH THE DEEPEST AFFECTION AND RESPECT

OF

THE AUTHOR.

TO

WILLIAM STOKES, ESQ., M.D. M.R.I.A.

REGIUS PROFESSOR OF PHYSIC IN THE UNIVERSITY OF DUBLIN, &c., &c.

This Work is Dedicated

AS A

SLIGHT TOKEN OF ADMIRATION, ESTEEM AND GRATITUDE,

BY

THE AUTHOR.

PREFACE TO THE FIRST EDITION.

I HAD given up all thoughts of again appearing before the Profession as an author, when an application was made to me from America to write a work on diseases of children. I did not like to refuse so flattering a compliment, and the present volume is the result, which I venture to lay before my professional brethren in this country, hoping for the same kind indulgence I have heretofore received.

There is one portion of the history of infantile diseases which has hardly received the attention it deserves. I allude to the secondary affections,—those which occur in the course of other diseases, and are in some intimate but obscure way connected with them almost in the relation of cause and effect. They complicate and often confuse the symptoms of the primary affection, always seriously increase its danger, and often render it hopeless of cure. Their early detection, or, what is far better, their anticipation and prevention, forms a very important part of the physician's duty; and I have endeavoured, as far as I could, to facilitate this object, by carefully noticing both the complications to which each disease is

liable, and the primary disorders to which it may become secondary.

Another point which is of great importance in the treatment of diseases of children, is to observe and remember the prevailing epidemic or the atmospheric constitution of the time. All diseases are more or less thus modified, and with children this is very remarkable, not merely as regards the symptoms but the treatment also. Without a careful attention to this matter we shall often aggravate instead of relieving the condition of the child.

I have found it extremely difficult to lay down minute and specific plans of treatment for individual cases, or for the various modifications of disease, and I fear in this respect my book may be thought deficient; I have, however, always indicated the principles which must guide us in the management of the disease, and I have preferred leaving their adaptation to the sagacity and judgment of the practitioner.

I have sought information wherever I had reason to believe it was to be found. I have consulted all the authorities within my reach, and have carefully referred to those from whom I have quoted, but yet I fear that many faults, both of omission and commission, will be observed. For all defects I must request the indulgence of the reader, who I hope will bear in mind that the work has been written in the midst of the distraction of professional business, or at hours which are usually devoted to rest.

PREFACE TO THE SECOND EDITION.

IN preparing a new edition of this work for the press, I have endeavoured to avail myself of every source of information in my power, whether in the published experience of others, or in the increasing extent of my own practice. I have thankfully availed myself of any hints for the correction of errors, or for the addition of new matter. Several entirely new chapters have been added, many others amplified, the whole carefully revised; and although I am very conscious of many deficiencies, yet I trust that it is at least more worthy of the kind favour with which it was received at first. I have also availed myself of the labours of my American editor, Dr. Keating, to whom I beg thus to express my obligations and thanks.

15, STEPHEN'S GREEN, DUBLIN.

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ON
THE DISEASES OF CHILDREN.

PART I.

ON THE MANAGEMENT OF INFANCY AND CHILDHOOD.

CHAPTER I.

PRELIMINARY OBSERVATIONS.

A VERY limited acquaintance with statistics, or even a moderate experience, is quite sufficient to convince us of the high degree of mortality which prevails among infants and children: literally, they spring up and are cut down like flowers of the field.

This mortality commences before the birth of the infant: from various causes, no inconsiderable proportion of those ushered into the world are still born. M. Quetelet, in his very learned and able work, states, that in the principal cities of Europe* the mean proportion of stillborn children is *one* in every *twenty-two* births; and the number is three times greater among illegitimate than among legitimate children.

The same author gives a carefully compiled table of the mortality of different ages in Belgium, which shows that of the infants born alive, *one-tenth* died within a month—a mortality equal to that between the ages of 7 and 24 years. By the *fifth* year, nearly one-half the number of children had died.†

In Prussia, during the interval from 1820 to 1828, the deaths in

* Sur l'Homme et le Developpement de ses Facultés, &c., vol. i. p. 121.

† Ibid., vol. i. p. 167.

the first year were in the ratio of 26.944 to 100.000. In France, in 1802, it amounted to 21.457; in Amsterdam to 22.735, from 1818 to 1829; in Sweden, to 22.453, from 1821 to 1825.

From the First Report of the Registrar-General of England, it appears that more than *one-third of the total deaths* in England and Wales occur *under two years* of age; the proportion being 42.54 per 1000 of the deaths registered: and *two* out of every *nine* infants entering upon life die within the first year. "Assuming seventy years as the natural term of life, we may form some faint conception, from the preceding facts, how many elements of destruction must still be left in full activity, when, as is the case in England, one-third of the race is cut off within the first two years of existence."*

In the Second Report I find that the total number of births was 480,090—of deaths, 331,007; of the latter, 72,304 were under one year, and 130,695 under five years of age. In the Third Report, the births were 501,589—the deaths, 350,101; of those under one year, 76,328; under five, 141,747. In the Fourth Report, the births were 504,543,—the deaths, 355,622; of those under one year, 75,507; and under five, 140,089. In the Fifth Report, the births were 495,574,—the deaths, 343,847; of those under one year, 74,210; and under five, 133,583. In the Sixth Report, the births were 517,739,—the deaths, 349,519; of those under one year, 78,704; and under five, 139,035. In the Sixth annual Report, will be found abstracts from foreign Reports, all showing the great mortality in the earlier periods of life.

In my friend Mr. Wilde's admirable Report in the Census of Ireland, he states that, in the ten years ending June 6th, 1841, the total number of deaths in the city of Dublin were 66,722, of which 10,553 occurred under one year, and 13,037 between one and five years of age.

Dr. Combe has extracted the following statistics from the *Liverpool Albion* of April 1, 1839. The deaths during the year 1838 amounted to 6,596, from which must be deducted forty-three still-births, leaving 6,553. Now at different periods of the first five years of life we find the following mortality:—

Under 3 months	.	.	.	.	.	.	792 deaths.
Above 3	"	and under 6 months,					313 "
" 6	"	" 9	"				319 "
" 9	"	" 12	"				311 "
" 1 year,		" 2 years,					802 "
" 2 "		" 3 "					321 "
" 3 "		" 4 "					183 "
" 4 "		" 5 "					121 "
							3,162 "

* Combe on the Management of Infancy, p. 10.

So much for the mortality generally: if we inquire into details we find it always great, though varying; as, for example, between the children of the poor and those in comfortable circumstances; between the poor in towns and those in the country; or between the poor in different towns, or in different parts of the country different in hygienic conditions; proving conclusively, that the mortality depends, to a certain extent, upon external circumstances, and also that it is in some measure under the control of good management.

From Dr. Granville's tables of the mortality among the poor of London, we find that 458 in every 1000 children under two years of age died.

From the First Report of the Registrar-General, already quoted, it appears that, in the mining parts of Staffordshire and Shropshire, in Leeds and its suburbs, and in Cambridgeshire, Huntingdonshire, and the lowland parts of Lincolnshire, the deaths of infants under one year have been more than 270 out of 1000 deaths at all ages; while in the northern counties of England; in Wiltshire, Dorsetshire, and Devonshire, in Herefordshire and Monmouthshire, and in Wales, the deaths at that age, out of 1000 of all ages, scarcely exceed 180.* Compare, again, Manchester, Salford, and their suburbs, where the number of deaths under two years of age was 429.98 per 1000, with Westmoreland and Cumberland, where the proportion was only 276.35 per 1000.

In Mr. M'Clean's Visit to St. Kilda, he states that, "*eight out of every ten* children die between the eighth and twelfth days of their existence;" and this, he conceives, is mainly owing to the "filth in which they live, and the noxious effluvia of their homes."

But there are more shocking evidences still of the result of bad accommodation and mismanagement. For example, Dr. Combe states† that, "about a century ago, the workhouses of London presented the astounding result of *twenty-three deaths* in every *twenty-four* infants under the age of one year. For a long time this frightful devastation was allowed to go on, as beyond the reach of human remedy. But when at last an improved system of management was adopted, in consequence of a parliamentary inquiry having taken place, the proportion of deaths was speedily reduced from 2600 to 450 a year."

Another illustration of the effects of management is afforded by the mortality in lying-in hospitals. Dr. Willan gives the following proportions:—

From 1749 to 1758	1 in 15 children died.
" 1759 to 1768	1 in 20 " "
" 1769 to 1778	1 in 42 " "
" 1779 to 1788	1 in 44 " "
" 1789 to 1798	1 in 77 " "

* Report, pp. 25, 44. † On the Management of Children, p. 14.

In the valuable paper of the late Dr. Joseph Clarke,* of this city, he mentions that, "at the conclusion of the year 1782, of 17,650 infants born alive in the Hospital, 2944 died within the first fortnight," that is, nearly every *sixth* child; and that of these nineteen out of twenty died of nine-day fits. This Dr. Clarke attributed to want of adequate ventilation, which he proceeded to remedy with great success, for of 8033 children born after a free circulation of air had been secured, only 419 died, that is, about 1 in $19\frac{1}{3}$.

This rate of mortality has continued to diminish, for we find in the admirable Report published by Dr. Collins, that during his residence "the total number of children born was 16,654; of these 284 died previous to the mother leaving Hospital; this is nearly in the proportion of one in $58\frac{1}{2}$, which would be considered a moderate mortality under any circumstances; however, when it is considered that this includes not only *all the deaths that occurred in children born prematurely, and in twins, but also every instance where the heart ever acted, or where respiration ceased in a few seconds after birth*, the proportion of deaths becomes *trifling* indeed."†

Foundling hospitals exhibit another instance of the connection between the management and the rate of mortality in children. In the Foundling Hospital of this city it appeared, on inquiry by Parliament, that of 10,275 children sent to the infirmary of the hospital during the twenty-one years ending in 1796, only forty-five recovered, a statement, as Dr. Hawkins observes, which at this moment seems incredible.‡ A change of plan was made, wet nurses were employed, and children sent to them in the country, and the results were most beneficial. From June, 1805, to June, 1806, 2168 infants were taken into the house, and only 486 died there—a manifest improvement.

In Vienna, in 1811, the mortality was 92 per cent.; in Brussels, from 1812 to 1817, it was 79 per cent.; in Madrid, in 1817, it was 67 per cent.; that is, three or four times greater than the average mortality in private life. About one-half of the foundlings of Paris and St. Petersburg die during the first year, notwithstanding the care and attention bestowed.

Dr. Combe quotes an interesting illustration of the effects of improved management in the Orphan Asylum of Albany, U. S., "which was opened in the end of 1829, with about seventy children, but in which the average, up to August, 1836, subsequently amounted to eighty. During the first three years, when an imperfect mode of management was in operation, from four to six children were constantly on the sick list, and sometimes more; one or two assistant nurses were

* Transactions of the Royal Irish Academy, vol iii. Collin's Practical Treatise, p. 514.

† Practical Treatise on Midwifery, p. 500.

‡ Medical Statistics, p. 130.

necessary; a physician was in regular attendance twice or thrice a week, and *the deaths amounted in all to between thirty and forty*, or about one every month. At the end of this time an improved system of treatment was begun, and notwithstanding the disadvantages inseparable from the orphan state of the children, the results were in the highest degree satisfactory." "The nursery was soon entirely vacated, and the services of the nurse and physician no longer needed; and *for more than two years no case of sickness or death took place*. In the succeeding twelve years there were three deaths, but they were new inmates, and diseased when they were received, and two of them were idiots.*

In the last edition of Dr. Underwood's book, are given the results of an inquiry into the mortality among the children of the poor in London, made at the British Lying-in Hospital. "Several women who had borne—

3	children	had	lost	as	many	as	.	.	.	.	2
4	"	"	"	"	"	"	.	.	.	.	3
5	"	"	"	"	"	"	.	.	.	.	4
6	"	"	"	"	"	"	.	.	.	.	5
7	"	"	"	"	"	"	.	.	.	.	6
8	"	"	"	"	"	"	.	.	.	.	7
9	"	"	"	"	"	"	.	.	.	.	8
10	"	"	"	"	"	"	.	.	.	.	9
11	"	"	"	"	"	"	.	.	.	8 and 10	
12	"	"	"	"	"	"	.	.	.	10 and 11	
14	"	"	"	"	"	"	.	.	.	.	11

"And several mothers of the different numbers had lost them all. During another long period, only one woman, having borne as many as five children, had reared them all; and one having had twelve, had *eight* living. But some, having had *four*, had lost *three*; and five had lost *four*; and six, *five*; and seven, *six*; and eight, *six* and *seven*; and ten, *seven* and *nine*; and women having borne eleven and twelve, had lost, *eight*, *nine*, and *ten*; and fourteen, *eight*; while many, who had borne four, five, and six, one twelve, and another twenty-one, had buried them all. In addition to this, may be remarked the sad and rickety state of many of the surviving children."†

I quite agree with the remark of Dr. Combe, that, although it be in hospitals and other institutions for children that the most fearful results of bad management have occurred, "we must not infer that the records of family practice are altogether unstained with cases of a similar nature, and that among the wealthier classes, at least, nothing more can be done for the preservation of infant health and life. On

* On the Management of Infancy, p. 22.

† On the Diseases of Children, tenth edition, p. 85.

the contrary, we have too good reason to believe that, even among the best educated classes, many lives are cut short by mismanagement in infancy, which might be saved, if the parents only possessed in time a portion of that knowledge and practical sense which dire experience sometimes impresses upon them when too late.”*

The facts which have been laid before the reader—and which are not a tithe of what might be adduced—are sufficient to show that a large proportion of infants are stillborn; that another large proportion die in early infancy; that this proportion is vastly increased by bad management, and may be diminished by good management; and that there will still remain a large mortality from disease, arising from causes over which we have but little control, but which may still be diminished by judicious medical treatment.

Thus the work before us is naturally divided into an inquiry, *first*, into the causes of disease during intra-uterine life, or immediately after birth; *secondly*, into the management of infants and children; and *thirdly*, into the diseases which are peculiar to, or very prevalent during infancy and childhood.

It does not, however, form part of my purpose to give more than a brief sketch of the first division; and as the book is written for medical practitioners rather than for nurses, I shall content myself with laying down the leading principles that ought to guide us in the management of children, instead of minute details; reserving the main portion of the work for a full and careful consideration of the diseases incident to this period of life.

Let us first consider the circumstances in which the infant is placed during intra-uterine life. During the nine months of gestation, the fœtus, inclosed in the membranes, is immersed in, and surrounded by the liquor amnii, which has the double effect of preserving an equable temperature, and diminishing the effect of external shocks, and of the movements of the mother, upon it. It is connected with the mother by means of the placenta and funis umbilicalis, and, through the medium of these structures, that change in the fœtal blood is effected which is essential for the life, nourishment, and growth of the child.

Apparently, whatever communication there is between the mother and child is very indirect, *i. e.*, anatomically speaking, but we have pathological evidence of a very direct influence exerted by the parent upon her offspring—in those cases, for example, where mental emotion in the former has quickly extinguished life in the latter; and those in which children have exhibited at birth, traces of disease which must have been acquired through the mother.

What are the active organic functions during intra-uterine life? Almost exclusively those connected with nutrition. Aeration of the blood in the placenta (which is a vicarious and temporary substitute

* On the Management of Infancy, &c., p. 25.

for the lungs) or uterine sinuses—absorption of the contents of the vesicula umbilicalis at an early period, and of the liquor amnii by the skin, and perhaps by the stomach, at a later—are functions which are evidently active.

We have also evidences of a limited amount of excretion, in the meconium contained in the intestines, and in the urine by which the bladder is often filled at birth. The circulating system is, of course, active as an agent in the growth and development of the fœtus; the respiratory system is quiescent. The nervous system is, in general, so far as we can judge, inactive, except as it may be involved in the general organic development, although the sudden movements of the child, when cold is applied to the abdomen of the mother, show a quick sensibility to alterations of temperature.

So far, then, the condition of the fœtus *in utero* is one of quiescence, except as regards the functions of nutrition and development. Secluded and protected by exquisite arrangements, in its temporary abode, from all external influence and injury, it is at once, at the termination of gestation, plunged into the midst of excitement, and exposed to influences and impressions which act rudely on organs hitherto untried. “In one instant it is transferred from unconscious repose, solitude, and darkness, to life, and light, and action. From being surrounded by a bland fluid of unvarying warmth, it passes at once to the rude contact of an ever-changing and colder air, and to a harder pressure, even from the softest clothing, than it ever before sustained. Previously nourished by the mother’s blood, it must now seek and digest its own food, and throw out its own waste. The blood, once purified and restored through means of the mother’s system, must now be oxygenated by the child’s own lungs. The animal heat once supplied to it by another source must now be elaborated by the action of its own organs.”*

The first impression, and a most painful one, is that of cold, and the first act is to evince its sufferings by cries and struggles. No doubt, benefit is derived from this, it assists in establishing perfect respiration, and gives an impetus to the general circulation.

The distress occasioned at first by cold is augmented by the comparatively rough handling, washing, and dressing, and by the stimulus to which each sense is exposed. The eye, hitherto closed in darkness, opens to the light, and the ear for the first time is exposed to various and confused sounds; and the brain and nervous system, so far used to but few and simple impressions, become the centre of varied and complicated ones from each awakened sense, and these impressions, for the most part, painful.

Moreover, a very remarkable change takes place in the posture and muscular movements of the infant. Not that it makes no muscular

* Combe on the Management of Infancy and Childhood, p. 180.

exertions previously, but from the small space in which it was confined, these were necessarily limited and uniform ; a limb could be moved to and fro, but complete extension was impossible. Now the infant lies at full length, and under the handling of its nurse stretches forth its limbs, and struggles violently in its impotent distress.

Very shortly after birth the organs of digestion are called upon to perform their functions, and although the food be mild and bland, yet the process is ordinarily a prodigious step beyond the functions hitherto performed by the stomach, if indeed this organ was at all active during gestation.

When we consider, therefore, that from a state of quiescence, and simple organic nutrition, the infant at birth is roused into a state of functional and organic activity, with each sense exposed to vivid impressions from its own peculiar stimulus, and these concentrated, as it were, in successive and powerful impressions upon the nervous system, it cannot be a matter of surprise that any individual organ should be liable to derangement or disordered action ; much less when we reflect upon the sympathetic interdependence of organs and systems, and remember how disorders of the one entail disorders in another, and how apt simple or complex disorders of organs are to entail serious disturbance in the nervous system. Under such circumstances, one would anticipate considerable liability to disease during the first month, even under the most judicious management.

But a little more detail will be necessary to exhibit fully the sources of disease to which the infant is exposed before, at, and immediately after birth.

Although the *foetus in utero* be completely protected from external morbid impressions of the ordinary kind, yet we do not find it secure from indirect influences which may excite disease during intra-uterine life. From the maternal blood are derived those changes which render the *foetal* blood suitable for nutrition and growth ; if the mother be in perfect health, these changes may be expected to be of a natural and healthy character ; but if she be unhealthy, whether temporarily or continuously, then a corresponding deterioration of the *foetal* blood may take place, and individual organs or the growth of the child may suffer.

Again, it seems undeniable, though not to be established by anatomical research, that some kind of nervous communication exists between the mother and child before birth ; at least it is certain that vivid impressions, bodily or mental, upon the former, may be transmitted to the latter, and injury or even death be inflicted.

Here, then, are two external sources of disease in the *foetus*, originating in the bodily or mental condition of the mother : mischief may arise to her child from neglect of herself, from unavoidable ill health, or from excessive mental emotion. This consideration is of such importance, and appeals so directly to the most powerful feelings of

womanly nature, that it ought to be sufficient to insure an adequate attention to health in all likely to become mothers. Common sense and a little self-denial will generally secure all that is in her power. The diet and regimen generally should be arranged so as to afford her sufficient nourishment without over-feeding, and only a moderate use of beer or wine should be allowed. Exercise is necessary to health, but it should be taken moderately, and at proper times, avoiding undue fatigue, exposure to inclement weather, and wet feet. And it should not be forgotten that rest is as necessary as exercise; so that excessive fatigue from violent or prolonged exercise, and from late hours must be absolutely avoided. After exertion, the use of the couch or sofa, instead of a chair, is a great comfort to the patient.

Her dress, too, will require care, so as to secure warmth and avoid all pressure. She ought to be contented to give up the attempt at a fashionable appearance, as she must that of a fashionable shape; and if she can be persuaded to abstain from parties and numerous assemblages, and late hours, it will be all the better for her own and her child's health.

The authoress of the *Good Nurse* very sensibly remarks: "When a young woman acts from principles of reason and religion, she will consider proper care of herself during pregnancy an imperious duty, not only on her own account, but from the reflection that the life of another is interwoven with her own, whom she is bound by every virtuous feeling to cherish, and that with the utmost tenderness; being aware that improper management of herself during this period may be destructive of the being for whose life she is responsible. The most important part of her duty is to guard her mind against every innovation of temper or uneasiness. When the heart is graced with affection, its engaging influence pervades every feeling, and smooths and tranquillizes the mind upon all occasions. I am decidedly of opinion that if we suffer every trifling disappointment and cross-occurrence to ruffle and disturb us, it is a certain mode of corroding our peace and very materially injuring the health; which at all times should be carefully guarded against, but more especially under these circumstances."*

"During pregnancy," observes Dr. Combe, "the great aim, for the sake of both parent and child, ought to be, to sustain the general health in its highest state of efficiency; and in order to attain this the mother ought to pursue her usual avocations and mode of life, provided these be such as are compatible with the laws of health. Regular daily exercise, cheerful occupation and society, moderate diet, pure air, early hours, clothing suitable to the season, and healthy activity of the skin, are all more essential than ever, because now the

* The Good Nurse, p. 106.

permanent welfare of another being is at stake in addition to that of the mother.”*

But besides the indirect sources of disease already mentioned, another may be found in the temporary apparatus provided for the nutrition of the fœtus. The placenta may be regarded as a species of gland, consisting of a congeries of vessels, and being very liable to have its circulation disturbed. This may be temporary, or it may issue in inflammation, which may give rise to alterations of structure in one or more of the lobes or lobules of which it is composed. If it be of a very great extent, it must, more or less, interfere with the perfect nourishment of the fœtus, and, notwithstanding all the compensating powers, will not unfrequently suffer from disease as the consequence.† The same may be said of any malformation or disease of the other portions of the fœtal apparatus.

Moreover, we possess ample evidence to prove that the fœtal organs may be affected by almost as great a variety of diseases as after birth, without our being able to trace them to any of the causes just mentioned; or, in other words, that without apparent external cause, diseased action may arise, and morbid changes take place in any of the fœtal structures. As I shall have occasion to allude to some of these pathological states hereafter, I shall at present merely refer the reader to the work of Dr. Graetzer, *Ueber die Krankheiten des Fœtus*, in which the author has with great industry collected examples of eighty-two different diseases which have been recorded by those in whose practice they occurred.

The process of transition into the world, in the vast majority of cases, inflicts no injury at all upon the child, but in some cases of difficult labor it does not escape so well. Pressure of the head, if beyond a certain amount, may injure the brain or cranium; arrest of the circulation, by compression of the navel-string or the vessels of the neck, may cause asphyxia, congestion, apoplexy, or effusion of blood into the substance, or upon the surface, of the brain or membranes. Impaired vitality, or death may be the consequence.

After birth, exposure alone, “taking cold,” as it is called, is often a cause of immediate disorder, the eyes, eyelids, or Schneiderian membrane, becoming inflamed. The unused condition of the lungs, the sudden access of air to the delicate bronchial tubes, the increased vascularity of their lining membrane, and the enormously increased circulation in the lungs, which have superseded the placenta in its function of aerating the blood, afford ample grounds for the incursion of disease, which will be rendered still more probable if the air be too cold or in any way impure. Continued crying, from suffering or discomfort, may be considered as violence applied to the air-tubes, and anything which

* On the Management of Infancy and Childhood, p. 91.

† Simpson on Diseases of the Placenta. Edinburgh Med. and Surg. Journal.

quickens or renders irregular the circulation in the lungs, may be said to add an additional stimulus to diseased action in so delicate an organ. Prolonged decubitus has been recently suggested as one principle cause of the mortality in the Foundling Hospital of Paris, from its effect in producing inflammation of the lungs, and it seems certain that change of position and gentle movements are as necessary for the health of internal organs as for muscular development.

The digestive system is exposed to danger both from the quality and quantity of the food submitted to it. The process of appropriating even the blandest food increases the vascularity of the mucous membrane and the entire circulation in the organs engaged; if the food should be unsuitable, improper, or in too great quantity, instead of nourishment the result will be injury both to the organs individually, and, as a consequence, to the system generally.

Excitement of the brain and nervous system is of a multiplied and complex character. Possessing exquisite sensibility, each sensuous impression is acutely felt, though transitory, and obliterated probably by the one succeeding. This variety or succession of impressions is advantageous, for the boundary between excitement and irritation of the nervous system is so easily passed, that a deep or prolonged impression could scarcely be without injury, as we see when an infant is exposed to an excess of light or noise; but this is even more evident when we reflect that impressions from more than one sense are concentrated upon the brain at the same time. The natural or unnatural stimulus to any organ is a stimulant to the nervous system of more or less power. To give an illustration of what I mean, it is clear that a very bright light will stimulate the brain through the organ of sight, and singly it might be injurious; but if at the same time the ear communicate a painful impression of a loud noise, and the skin of rough handling, the stimulus to the brain is tripled, and the probabilities of injury so much increased.

If, however, the natural action of the organs of sense upon the brain may be injurious, how much more so must be their diseased action, and that of other organs also? The relation which the organs of sense in their normal condition, bear to the nervous system, is evident; not so that of the other organs of the body; the close tie which connects these latter is principally evidenced in cases of disease. Thus we find that, while healthy food is digested with no apparent effect upon the nervous system, indigestible food may excite convulsions, &c.

Many similar examples might be adduced to prove that disordered action of different and distant organs is concentrated as it were, upon the nervous system, giving rise to secondary but very important diseases thereof.

From this cursory sketch we may see that the infant is exposed to various causes of disease both before and after birth; that previous to its entrance into the world it may receive direct injury from its mother; or, indirectly, through the deterioration of her blood; that

disease in its temporary organs of nutrition or in its envelopes may inflict damage upon the fetus ; and that none of its organs are exempt from diseases which are excited by causes beyond our means of appreciation.

Again, the process of transition into the world may leave injurious effects upon the organ or structure submitted to pressure, or if the compression be excessive, it may prove fatal.

Lastly, supposing the infant to escape with impunity so far, each organ and system has to undergo a severe trial at the assumption of its natural functions. From the newness of all impressions, and from the organs not having acquired the power of adaptation and modification which they subsequently possess, the natural food of each, the very process of nutrition and support, may excite disease. That which each organ seeks as its pabulum (*e. g.*, light for the eye, food for the stomach, &c.) may, in its delicate state and unlimited exposure, be highly injurious from its quantity or quality.

The intricate and extensive sympathies of the different systems, slightly evident in health, but very marked in disease, are another source of mischief. In childhood scarcely any disorder exists alone for any length of time, and we shall find hereafter that the secondary diseases of childhood are not inferior in importance, and require as careful an adaptation of remedies, as the primary ones. If we add the evils that result from bad management, the cause of the great mortality in infancy will be in a great measure explained, and the best reason given for the rules I shall lay down for the management of children.

But before commencing this subject, it may not be amiss to notice some organic peculiarities of childhood, and to say a few words upon the growth and development of the infant.

Respiration being established, and the lungs distended, the volume of the chest is materially increased and continues to enlarge for some time in its full proportion. The heart, also, having some work to perform in transmitting the blood through the lungs, acquires greater size. The pulmonary blood-vessels are largely developed, and are occupied in carrying the blood to the lungs to undergo the process of aeration. The foramen ovale, which allowed the blood to pass from the right to the left auricle before birth, is gradually closed, and the ductus arteriosus obliterated. During early infancy the circulation is rapid, the pulse being from 100 to 120 or 130, and the respiration proportionably quick ; as the age increases, these both gradually subside.

The principal peculiarity of the digestive system appears to be the balance there is between nutrition and excretion, and the rapidity of these functions. Children eat oftener and evacuate more frequently than older persons, and upon the due proportion between the two, their health in a great measure depends.

The nervous system is remarkable for its delicacy, the rapidity with

which its functions are performed, and the quick exhaustion that follows. A child will exert himself in a greater ratio than an adult, but he requires more sleep.

The power of generating heat in infancy is much less than in after life. The great sources of animal heat are respiration, digestion, and the nervous influence. "If, then, free respiration, vigorous digestion of nourishing food, and active nervous influence, are the chief sources of animal heat, it would be contrary to reason and common sense to expect its rapid evolution in infancy, the very period at which these functions are most imperfect and come into play for the first time, amidst an active revolution in the state of living and habits of the child, which is anything but favorable to their exercise. How can respiration be free and vigorous when the lungs are still small and their air cells still imperfectly expanded? And how can the new-born infant produce heat from *chyme*, which is itself the product of a digestion that has not yet taken place? Again, how can digestion be vigorous where no food has ever been swallowed, and when the first aliment derived from the mother's breast is so thin and watery as scarcely to admit of digestion at all? And how can sustained nervous energy be healthily supplied when the nervous fibres have, for the first time, encountered their objects, and whole days are spent in sleep, and when the circulation is driven off its balance by the variety of new functions at once excited into action. To the eye of reason it seems impossible to convey these facts, without acknowledging that to expect the vigorous generation of animal heat in such circumstances, would be very much like expecting an oak to grow without roots, or a fire to burn without air. Notwithstanding this, however, it was once, or rather it still is, a matter of popular belief, that infants have a great power of resisting external cold, and are even invigorated by it. But Milne Edwards has now demonstrated that, in accordance with what might be expected *à priori*, the power of generating heat is at its minimum in all animals immediately after birth, and that it rises progressively as their development, strength, and internal activity increases. In conformity with this rule, it appears that in prematurely born children, the heat of the body is several degrees below the natural standard, and is very easily depressed still further by external exposure. In one instance, of a seven months' child, the thermometer stood at 89° Fahr. instead of 98°, or nine degrees below the usual temperature in the adult."*

The muscular and osseous systems are scarcely completed at birth, or, when completed, they have but little of the strength or vigour necessary for use, but, as in the case of the internal organs, every day adds to their development and power.

* Combe on the Management of Infancy, p. 119. This is an excellent little work, which I would strongly recommend to the notice of all interested in the management of children.

Now let us take the case of an infant after the excitement to which it is immediately exposed at birth. Under the influence of exhaustion it sleeps long, and each hour of excitement is thus followed by rest for the senses and for the nervous system, and during these periods of rest, and in consequence of them, nutrition and growth proceed rapidly. Food, excitement, and sleep, divide the life of infancy, but the latter preponderate considerably in health. By degrees the organs of life become used to their food and able to employ it beneficially; the organs of sense are accustomed to the stimulus presented to them, and cease to feel it so acutely, or (as in the case of the eye) acquire the power of limiting its extent; and the nervous system, still sensitive, gives evidence that all sensation is not painful.

Further, after a while it is clear that another step in advance has been taken, though the proof is slight at first; the child is conscious of something external to himself; he sees, not light merely, but objects; he hears, not sounds simply, but sounds proceeding from something, towards which he endeavors to turn. A light object immediately attracts attention, and if it be moved the infant will endeavor to follow it with its eye. If the room be darkened, and a space in the curtains admit a ray of light, or if a candle be visible, we may remark that, as the infant of a fortnight old lies on its nurse's lap, it is towards this that its eye is steadily directed.

After this education of the eye to light and luminous objects, and of the ear to sounds, and to the sources whence the sounds proceed, has continued for some time, we may perceive another step in advance—the child *recognizes* certain of them. The mother's voice occasions a start and smile of pleasure, and as the eye has acquired not so much the power of discriminating between objects as of recognizing one or more, the mother's face becomes familiar, and sound and sight together elicit from the baby its earliest expression of preference and affection.

But whilst this education of two of the senses for appreciating external relationship has been going on, other means of obtaining information have come into use. The muscles have acquired strength and facility from incessant motion during waking hours, and the touch, too sensitive at first, has become so regulated as to be rather a source of pleasure. By degrees the child acquires the use of the great organ of feeling, the hand, not only in touching objects but in grasping them, and the mind has thus opened to it another source of information, as to the external world, as extensive and valuable as that afforded by the eye. By the union of touch with sight, the infant obtains a knowledge of forms as distinct from surfaces; and it is probably to touch chiefly that it is indebted for the conception of substance.

This acquisition of information, concerning external sensible things, commences at a very early period: from the beginning the infant grasps a finger or any object presented to it; the next step is to maintain its

grasp and give a direction to its muscular effort, and this is attained by the endeavor to gratify another feeling. That which it seizes it speedily endeavors to convey to its mouth, at first with difficulty and uncertainty, but after many failures the power of direction is acquired, which after some time is extended, and the infant can at once put forth its hand direct to an object, grasp, retain, and direct it whither it pleases. This involves both muscular power and command, and mental or cerebral government.

After this we find another example of muscular action directed by the nervous system to a definite object, and modified by the faculty or power of imitation. Voice or sounds the child has produced from its birth, but it was expressive of two sensations merely, distress and pleasure; now, however, that the ear has acquired a certain amount of knowledge, and the muscles of the mouth and larynx a certain degree of power, an attempt is made to produce articulate sounds or words. The mother or nurse unconsciously appeals to the faculty of imitation with which children are so richly endowed, and after persevering endeavors a simple sound is divided and rendered distinct by the lips, and the child's first words, "pa-pa," "mam-ma," are uttered. As a general rule, though with many exceptions, labial words are first pronounced, then lingual, and lastly guttural.

Success in uttering one word is at once a reward and an incentive to fresh trials, and the distinct pronunciation of one or two is a lesson and an example to the child in its further efforts. Its vocabulary increases with considerable rapidity, single words are accumulated, complex ones are formed, two or more are joined, so as to form an imperfect sentence, but one sufficiently intelligible for the expression of the child's wants or feelings; and now the mental state is no longer exhibited in pantomime, but expressed with a definite consciousness on the part of the child, so as to be understood by those to whom its language is familiar. Its mental operations have been extended from the simple acquisition of knowledge to the power of communicating its own impressions to another. The influence of mind upon speech is very well illustrated in the case of idiots, who always learn to speak very imperfectly, and often not at all.

Whilst, then, compound processes have been developing, the entire body of the child has increased in size; the muscles of the back and lower extremities have become stronger and more active; the child has learned to use his limbs, and to maintain an erect position in the arms or when placed upon the floor. If he be put upon his feet and supported, he will make clumsy efforts to advance, lifting one leg and then the other; by degrees he discovers how to secure his progress by placing one leg before the other. Or he may first learn to creep upon the floor, and I think a child acquires a greater command of his limbs than when he learns to walk without first creeping.

Be this as it may, by one means or another he acquires all the muscular strength, agility, and tact, necessary to walk, and he only needs

the proper degree of cerebral government, or, as we say, "a steady head," to be able to walk alone. But this is not acquired till some time after he can walk pretty well with the aid of a finger. At length, however, the power of balancing himself and the courage to do so are attained, so that he can walk alone, and, like every natural acquisition, it affords a repayment of pleasure more than adequate to the trouble it has cost.

Having thus sketched the growth of the infant as to its senses, mode of acquiring a knowledge of external things, faculty of speech, and power of progression, it is not necessary to follow the subject further.

I shall at once proceed to consider the rules for the management of infancy and childhood.

CHAPTER II.

MANAGEMENT OF THE INFANT AT BIRTH.

IMMEDIATELY that respiration is fully established after the birth of the child, a ligature is applied round the navel-string, about two inches from the navel, and a second a few inches nearer to the mother, and the cord divided between them. The infant is then rolled in flannel and laid upon the bed, or taken to the fire until the nurse is at liberty to attend it. Common sense would teach us, as instinct teaches animals, that for some considerable time after birth great care should be taken to keep the infant warm, and observation only confirms this necessity by showing that the change of locality at birth involves a difference of at least twenty degrees. Dr. Edward's experiments have clearly proved the absolute necessity of increased warmth being afforded to the infant; and it is to be hoped that the foolish and injurious theories about hardening infants by exposure, using cold water, &c., will soon, by common consent, be exploded.

If the infant be very weak, it may be desirable to allow it to rest awhile before washing and dressing; but, in ordinary cases, the child may be taken to the fire and be washed and dressed immediately. Let the nurse so place herself that the infant may feel the warmth of the fire, but without being exposed to a bright light, and in many cases simple warm water will be sufficient to cleanse the skin. When it is thickly covered with the *vernix caseosa*, or creamy matter, neither warm water alone nor with the addition of soap will entirely remove it. Dr. Dewees recommends that every part of the child should be smeared with fine hog's lard before water is applied. This being done, the child

should then be carefully washed with lukewarm water and fine soap." Dr. Eberle mentions that fresh butter or the yolk of an egg is equally effectual. Both lay great stress upon the necessity of its complete removal. Now, without going so far in the opposite extreme as the German professor referred to by Dr. Dewees, who advises its being allowed to dry and drop off spontaneously, I do think that to prolong the operation of washing unduly for this purpose is unnecessarily exposing the child to cold and irritation. Let the nurse apply the lard, and afterwards, with a fine soft sponge, or flannel and soap and water, remove what she can in a reasonable time; the rest can easily be removed on the second washing after a few hours.

The head and face should first be washed, the eyelids and ears carefully cleansed, and the whole having been dried with a piece of soft linen, a flannel cap should be put on until exchanged for a warm nightcap when dressing is completed. In this country it is customary to apply a little whiskey to the head after drying it, to prevent cold. Whether it has this effect or not I cannot say; I do not think it necessary, but neither do I think it injurious, provided it be kept from the eyes.

Although the first washing of the child may be somewhat *slightly performed*, the second ought not, but the greatest care should be taken to cleanse not merely the general surface of the body, but all the folds and creases of the skin, *e. g.* those of the neck, axillæ, groins, buttocks, &c.; and, after drying them gently and thoroughly, all the parts where friction of one surface against another is possible should be well dusted with finely powdered starch or lapis calaminaris, or hair powder, or lycopodium, tied up in a little muslin bag. Eberle objects to this, as interfering with the regular transpiration of the skin, and as giving rise to a troublesome itching and harshness of the cuticle. I cannot say I have ever observed this except when the nurse had neglected to wash the parts so powdered, and general experience is certainly in favor of it. Excoriations are undoubtedly the result of neglecting this precaution, especially in fat infants.

After the child has been thus washed, dried, and dusted, the first step in dressing is to arrange the navel string; and it is well for the medical attendant to have an eye to this himself, first examining the cut extremity, to ascertain if there be any escape of blood, and if so, applying an additional ligature nearer to the abdomen. This is rendered necessary in many cases by the escape of the gelatinous fluid contained in the sheath of the cord, which renders the first ligature useless, and exposes the infant to hemorrhage when reaction takes place after washing and dressing. This point being secured, the fragment of the navel string is to be folded in a small piece of soft linen, and turned upwards on the abdomen, where it is to be retained by a light flannel binder, applied firmly and evenly, but not too tightly, which answers the double purpose of security to the cord and support to the navel specially, and to the abdomen and back generally. The

nurse should be careful not to wet the dressing of the cord when washing the child, and it need not be changed more than once or twice, if at all, before the separation of the fragment, which takes place spontaneously about the fifth or sixth day. I have known it to separate as early as the second day, and, on the other hand, to be retained until the fifteenth; but, however long may be the time, no effort should be made to detach it, as the risk of fatal hemorrhage would be very great.

The dress of the infant varies in different places, nor is it of much consequence, provided we secure warmth and freedom, that the materials be soft, that the parts be not too complicated, that too many pins be not used, and that undue and irregular compression of any part be avoided. Buffon gives a graphic description of vicious dressing in France, which may be observed at the present day: "With us in France, an infant no sooner leaves the womb of its mother, and has hardly enjoyed the liberty of moving and stretching its limbs, than it is clapped again into confinement. It is swathed, its head is fixed, its legs are stretched out at full length, and its arms placed straight down by the side of its body. In this manner it is bound tight with clothes and bandages, so that it cannot stir a limb; indeed, it is fortunate that the poor thing is not muffled up so as to be unable to breathe; or if so much precaution be taken as to lay it on its side, in order that the fluid excretions voided at the mouth may descend of themselves; for the helpless infant is not at liberty to turn its head to facilitate the discharge."*

Dr. Dewees and others of high authority, recommend that flannel should be used next the skin; from this, however, I must beg to differ; it is not necessary in order to secure sufficient warmth, and a little muslin or linen chemise is much softer and cleaner than any other inner garment; it should be changed every day, and flannel may be used outside. Except the chemise, all the garments are made long, for the sake of warmth, and if the parent possess common sense, she will not adopt the cruel fashion of short sleeves. The nurse should be very careful to change the napkins the moment they are soiled, as otherwise the buttocks will become inflamed and excoriated, and the child exposed to great suffering; and when changing them, warm water and a soft sponge must be used if necessary. The same napkin should not be again used until it has been washed.

The cap should be soft and warm, so as to protect but not compress the head.

When the child is washed and dressed, which should be done in less time than we have taken to describe it, it may be placed in bed with its mother, or, wrapped in a flannel shawl, be laid in its cradle, in a warm part of the room, equally removed from light and draughts.

* *Histoire Nat.*, vol. iv. p. 190.

About this time, however, or shortly after, it is customary to give a grain of calomel, a few grains of rhubarb, or a teaspoonful of castor oil, for the purpose of clearing away the meconium. This has been objected to as unnecessary, on the ground that the first milk of the mother possesses purgative qualities. Granted, but then it is not available for hours, or it may be days, and certainly the infant seems uneasy until the meconium has been evacuated. It is better to take a middle course; to allow a few hours' rest after washing and dressing, and then, if the bowels be not spontaneously moved, to give a teaspoonful of castor oil in a little warm water and sugar. I think the oil a better medicine than either calomel, rhubarb, or magnesia.

When the complexion is changing about the third or fourth day, and the skin presents an unusually yellow tinge, without being actually jaundiced, then a grain of calomel will be found very beneficial.

For some hours the child will not require food; its first necessity is warmth and sleep. After the oil has been swallowed it should be placed in bed or in the cradle, and allowed to rest as long as it will.

On awaking it will generally be found to have passed water, and perhaps to have evacuated the bowels, and as it will then feel hungry, it will intimate the same in a way not to be mistaken. At this time, say three or four hours after birth, the secretion of milk has not generally commenced, and therefore the nurse must feed the child. A little milk and water nicely sweetened, will be the best food at this period; it is more simple, and less likely to irritate the delicate mucous membrane of the stomach, than gruel or prepared barley, &c.

Dr. Maunsell states, that "Professor Joerg recommends that nothing should be given but a few teaspoonfuls of lukewarm water, and we happen to know that such is his practice, without any bad results, in the lying-in hospital at Leipsic."*

But it cannot be too constantly remembered, that the proper food for the infant is the mother's milk, and that the earlier we endeavour to obtain this the better for both.† To the infant it affords the simplest, most natural, and healthy nutriment, and the mother may

* On Diseases of Children, p. 34.

† Raulin (*De la Conservation des Enfants*, vol. ii. p. 177) in 1769, and Deleurye (*La Mère selon l'Ordre de la Nature*, p. 32) in 1772, recommend an early application of the child to the breast. The latter advises that it should be suckled as soon as the mother has rested and become tranquil. The same opinion is held by all the more sensible writers since. "The child," says Dr. Darwall, "should be put to the breast as soon as the mother has recovered from the immediate exhaustion of labor. In this way the breast, tender probably, and easily excoriated, gradually becomes able to bear the increasing strength of the child. At first its suckling is little felt, its efforts being feeble, and scarcely

be thus saved from uterine hemorrhage, mammary congestion, and milk fever, which latter are so frequent when nursing is postponed for three or four days. The child should be put to the breast, and allowed to make the attempt to suck, as soon as the mother has recovered from the fatigue of labor, say in eight or ten hours: if the secretion have not commenced it will not persist, and must be fed, but in most cases it will obtain some milk, and by the effort the ducts will be freed, and the secretion quickened. So long as the supply is inadequate, the deficiency must be supplied by a little milk and water with sugar, but if the breasts secrete any, the child should be applied to them when it is hungry, before we have recourse to feeding. In many cases after the first child, the mother is able to begin at once, and to continue to nurse her infant, without additional aid; but in others, especially in primiparæ, we sometimes find that no milk is secreted for two or three days.* Now in such cases to let the child suck frequently would not merely be useless, but positively injurious; it would obtain no nourishment, and the nipple would be irritated, inflamed, and excoriated.† The child should be fed, and only once or twice a day placed to the breast.

sufficient to draw in any nutriment; gradually the milk is more plentiful, the exertions of the infant more vigorous, but at the same time the breast is become more capable of enduring them.”—*Plain Instructions for the Management of Infants, &c.*, p. 6.

* With women of a nervous temperament, who are excessively anxious to nurse, this very anxiety may postpone or suspend the secretion of milk. No doubt every one has met with cases of this kind, which are not always easy to manage. I have found a suggestion of the late Dr. Graves, very successful. Order some “milk powder,”—a few grains of some innocuous or inert substance, *e. g.*, Pulv. Contrayervæ,—to be taken three times a day, and give the patient assurance that *after three or four days* the milk will be produced. The anxiety thus relieved or postponed will allow nature fair play, and in the majority of cases your “powders” will have the credit of success.

† Few things occasion greater suffering than cracked or ulcerated nipples, and it is not always possible to avoid them. I have found a modification of Professor Oslander’s method the best means of avoiding them. For a month or six weeks before confinement the nipples should be washed night and morning with fine soap and water, and after carefully drying them, they should be bathed with equal parts of spirits and water. Dr. Strahl recommends a lotion made by digesting six drachms of galls in six ounces of white wine for twenty-four hours, to be applied three or four times a day, beginning at the sixth month.

CHAPTER III.

THE FOOD OF INFANCY AND CHILDHOOD.

HAVING now described the treatment of the infant immediately after birth, we shall next speak of its further management as regards food, clothing, air, and exercise, &c. ; but as a considerable change takes place in the habits of the child in the course of the second year, we shall speak of the care necessary during the first period of life, or infancy, and the second, or childhood, separately.

From what I have stated in the last chapter, the reader will anticipate the first canon I would lay down as regards food, viz. : that as a general rule the mother's milk, alone or nearly so, is the proper food of the first six months of infantile life, and that it is, with a few exceptions, the imperative duty of the mother to supply it.

To the credit of those who are below or above the influence of fashion—the most contemptible idol that ever man first made, and then worshipped—*i. e.*, of the great majority—women in these countries anticipate the period of nursing with pleasure, as drawing closer the tie between themselves and the objects of their tenderest love. They who reject the duty may not unlikely lose a portion of the affection, for the natural ordinances of the Creator cannot be violated with impunity.

All authors are agreed that human milk is not only the best, but one might say the only safe food for infants. The evidence adduced by Dr. Merriman against dry nursing is perfectly conclusive. He says "It has been part of my duty to endeavour to ascertain the amount of mortality among infants from this source, and after much careful inquiry and investigation, I am convinced that the attempt to bring up children by hand proves fatal *in London* to at least seven out of eight of these miserable sufferers ; and this happens whether the child has never taken the breast at all, or, having been suckled for three or four weeks only, is then weaned. *In the country* the mortality among dry-nursed children is not quite so great as in London, but it is abundantly greater than is generally imagined. The summer is the most favorable season for making the attempt : but if parents were fully aware of the hazard to which their children are exposed in the

Any mild astringent will answer the purpose—green tea, decoction of oak bark, alum and water, &c. Dr. Dewees prefers the application of a young but sufficiently strong puppy to the breast—this should be immediately after the seventh month of pregnancy.

endeavour thus to bring them up, they would rarely choose to place them under the care of the dry nurse.”*

We may conclude, then, that the best nourishment for the child is human milk, and that the proper person to furnish it is, undoubtedly, the mother. But then it may be asked whether this rule is universal, and without exception?—whether all mothers can and ought to nurse their children? The answer is simply that there are exceptions to this rule as to every other, depending upon constitution, temperament, or physical peculiarities of the mother, or upon the circumstances in which she is placed. These exceptions I shall now enumerate.

1. In some cases malformation of the nipple presents a great difficulty, or even an insuperable obstacle. It may be so little prominent, or so much tucked in, that the infant cannot seize it. A little care in drawing out the nipple during the latter months of pregnancy, or the application of a strong child, or a puppy according to Dr. Dewees, or a breast pump, immediately after delivery, before the breast fills, will sometimes succeed, if the malformation be not extreme, but if this be not effected before the breasts are distended, there will be little chance of success. I have seen one case, but only one, in which the ducts were imperfect or impervious; for, notwithstanding that the breasts were distended with milk, not a drop could be obtained by the infant, or by an older child, or by the breast pump. The lady has had four children, and was equally unable to nurse with all.

2. I have seen the milk abundant for a time, and then suddenly cease entirely, without apparent cause, the mother being in perfect health, and free from anxiety. In one case of this kind the lady nursed well for three months, menstruation then occurred, and when it ceased there was not a drop of milk in the breasts. There is nothing capable of restoring the secretion in such cases.

3. Occasionally, when the nipple is good, and the supply of milk pretty fair, it is in a great measure lost during the intervals of suckling; there is a sort of incontinence of milk. It is secreted when not wanted, and escapes as fast as secreted. If this should happen, as I have known it, in a case where one breast is useless in consequence of former disease, there will be a very inadequate support for the infant, and unless feeding agree very well with it, it will be better to obtain a wet nurse at once. It is by no means uncommon for one breast to secrete much more milk than the other, or even for one breast to be nearly quiescent, without apparent cause; but if the other breast secrete plentifully, and retain it, this will be no obstacle to the mother's nursing.

4. Women of an irritable, nervous temperament are seldom very good nurses. They are so much excited by external and even trifling circumstances, that the milk is constantly varying both in quantity

* Underwood, Diseases of Children, p. 13.

and quality, and the child will suffer in consequence. Their fears are aroused by every little change in the child's condition or appearance, and they suffer so much distress, that they are not unlikely to cause in this way the very danger they fear. Moreover, in women of this temperament the constitutional disturbance excited by nursing is too great for their own health or that of the child, especially with first children. I have seen a quick pulse, nervous tremors, night sweats, languor, and cough, which were alarming the patient's friends, disappear in two days on weaning her child. Drs. Gooch and Ashwell mention cases of mental disturbance depending on nursing, and I could add several more. For their own sake, then, and for their infant's, women of a nervous, excitable character should abstain from nursing their *first* child at all events.

5. It is quite out of the question for any woman to nurse who is laboring under severe organic disease, fever, exhausting discharges, or complaints which are hereditary or transmissible, such as phthisis, epilepsy, scrofula, syphilis, mental disturbance, &c. Nay, even a known tendency towards some of these diseases, their occurrence in *any* member of the family, or a general delicacy of constitution, should give rise to very serious consideration on the part of the physician, before he permit his patient to run the risk of perpetuating in her offspring such formidable disorders. Children of very delicate parents, when nursed by healthy countrywomen, are often found to grow up with constitutions more resembling their nurse than the mother. The chain of transmission has been broken.

6. Experience will show in many cases, where it would not have been anticipated, that the mother is unfit to continue nursing. Sometimes, without any apparent cause, the milk evidently disagrees with the child—either it vomits it all, or it is griped and purged, and does not thrive. In such cases it will be advisable to make a change. When menstruation occurs during lactation, the milk is apt to disagree temporarily; but if pregnancy take place, the disturbance may be more permanent. In the former case the infant should be given the breast less frequently for a few days, but in the latter it should be removed altogether.

In a very interesting paper, Dr. Davis of Chicago has shewn the effects of pregnancy and menstruation upon the milk. He found the globules very scanty when the patient became pregnant, and somewhat reduced when menstruation occurred during lactation. Pregnancy diminished all the solid and nutritive constituents of the milk in proportion to the advance of gestation, but the caseine, butter and salts were more reduced than the sugar and extractive matter. During pregnancy also colostrum corpuscles make their appearance, and with this exception, similar changes take place when menstruation occurs.*

* Trans. of American Med. Association, vol. ix., p. 417.

This does not agree with the investigations of Dr. Hermann Ploss, who found the water increased by improper food and bad digestion: diminished by pregnancy, menstruation, and by intervening illness, especially by acute colitis and chronic enteritis. Caseine was increased in much developed breasts, during menstruation, acute diseases, and mental disturbance. It was diminished from bad nourishment, in robust constitutions, chronic diseases, and typhus. The butter was increased in much developed breasts, pregnancy, acute and especially chronic diseases: it was diminished from bad nourishment, mental emotion, and tuberculosis with diarrhœa. Salts were increased in acute and diminished in chronic diseases.*

7. The mother may be so circumstanced, that she cannot undertake the office of nurse. Imperative (or imperial) duties and occupations may require her absence from her baby for so long a time during the day as to prohibit her undertaking the office without injury to the child. Fashionable life makes such heavy demands upon the time, energies, and health of its votaries, that it is fortunate for the child, when mothers, who cannot give up their amusement, do not add to their folly by attempting to nurse.

8. Lastly, great mental emotion, such as grief for the loss of relatives or dear friends, anxiety and worry from domestic trials or great public calamities, have an injurious effect upon the milk, and may seriously injure the child, although the mother's health may not apparently suffer. I have met with an instance of two sisters, who continued to nurse their infants during a time of severe domestic trial, and although the children were both healthy previously, yet, shortly after, one was attacked with arachnitis, and the other with an aggravated form of scrofula; both died.

These cases, and some others which may possibly occur, form exceptions to the rule laid down, that every mother ought to nurse her own child.

I have already stated, that the sooner the infant is put to the breast, after the mother has obtained a little rest, the better both for mother and child. If the milk be deficient in quantity, a little food may be given, but if the natural supply be adequate, or as soon as it becomes so, the child should be nourished by the mother alone, if strong enough, for some months, both night and day. The frequency with which the child should be put to the breast will vary a little according to its appetite, but it is desirable that, as far as possible, it should acquire regular habits of feeding. Every two or three hours will not be too frequent, if no food be given, and it will be well, if the nipples be tender, to bathe them with spirits and water each time after suckling, and with warm water before the next nursing, in order to prevent cracks or excoriations. A recent author has attributed the

* Journal für Kinderkrankheiten, 1, 2.

excoriation to the action of the infantile saliva upon the tender skin of the nipple, and has recommended washing with cold water after each application of the infant.

After four or five months it will be advisable to feed the child regularly once a day, so that, in case of an interruption or diminution of the natural supply from any cause, it may not suffer. As the child grows older, and its appetite increases, the mother may not have sufficient, and the feeding must be increased in quantity and frequency, at the same time it ought to have the benefit of all the natural food.

Of the varieties of food, and modes of administering it, I shall have to speak fully by and by; at present, therefore, I shall merely observe, that the food should be given as thin as possible at first. The nurse prefers it thick, "because," she says, "it is more satisfying;" and, no doubt, the child is quiet and heavy afterwards; but it is because his stomach is overloaded, and if it did not reject its load he would be liable to serious illness in consequence.

In conclusion, I would repeat, that, supposing the mother to be in good health, and her milk good and abundant, it is to form the staple nourishment of the child until within a short time of weaning; that he is to get all she has to give, and that any deficiency, whether from diminished secretion or increased appetite, is to be supplied by feeding.

So far I have assumed that the mother is able and willing to suckle her child, but this may not be the case, or after a trial she may be obliged to give it up. Then the choice lies between a wet-nurse and artificial feeding. There can be no hesitation in preferring the former, when a good one can be obtained; but as the well-being of the child, and much of the comfort of the parents, are involved, the medical attendant should be extremely careful in his

CHOICE OF A NURSE.

Of what may be called the domestic qualifications of the nurse, the mother, or some one deputed by her, will be the judge; but the decision as to her suitability *as a nurse* is very properly almost always left to the physician or surgeon. At the same time there are one or two points, not strictly medical, which are of importance, and should be inquired into. For instance, her temper, habits of life, and any peculiarity of her position, may be serious inconveniences. If she be liable to fits of passion and ill-temper, or indulge any vicious propensities, or be exposed to anxiety on account of her husband or children, the quantity and quality of milk will be depreciated, and she will not be a good nurse. Again, it is desirable that she should be naturally fond of children, that she may bear patiently and kindly their "*tracasseries*," and of a lively disposition, that she may amuse them and keep them cheerful and happy.

There is a general prejudice against taking as a nurse a woman after

her first confinement ; on the ground, I believe, that she has less experience, that there is a greater liability to menstruation, and consequent impregnation whilst nursing, and that the milk is less certain in quantity, and apt to cease suddenly, after the first child, than subsequently.

It is desirable to choose a nurse whose child is about the age of the one she is to suckle, or rather younger, if anything. At the same time, if the mother have suckled or fed her child for some weeks, or if it suffer from diarrhœa, it will be injurious to give it very young milk. Dr. Merriman observes : " Some ladies are very anxious to procure wet nurses who have not lain-in more than a fortnight or three weeks. I have seldom found the milk of such nurses answer so well as those whose children are eight or ten weeks old. They are not sufficiently recovered from the effects of parturition, to undertake the duties generally required of a wet nurse."

Both, mother and child should have the appearance of firm, good health : the nurse should have a clear, sound skin, without eruption or traces of scrofulous disease. Her mouth should be examined, and the state of her teeth and tongue ascertained ; if the former be perfect, and the latter clean, we may be satisfied that the digestive system is healthy.

The breasts should be of moderate size, both equally good, and firm, the bulk evidently formed by the enlarged mammary gland, and not by adipose tissue. Large, flabby breasts yield a very inferior supply of milk. The nipple should be of moderate size, well formed, and prominent, and we should observe whether the milk escapes involuntarily, or only when demanded by the infant.*

Let the nurse squeeze a little milk into a wineglass, in order to judge of its quality ; it ought to be thin, clear, of a bluish white color, very limpid, very sweet, and, if allowed to stand for a while, covered with cream.

It may also be subjected to chemical and microscopical analysis, as by these means more accurate information may be obtained. The comparative size and abundance of the milk globules, as revealed by the microscope, will enable us to estimate one very important element in its nutritive qualities, and the same instrument will enable us to

* "Nurses who have not a good supply of milk will occasionally be found to adopt a practice, commonly employed with milch cows when brought to market, and called 'stocking' by the cattle-dealers : that is, they allow the milk to accumulate in their breasts for several hours before presenting themselves for examination, so as to cause the examiner to believe that they are very abundantly provided. Young practitioners should be especially on their guard against this deception."—*Maunsell and Evanson on the Diseases of Children*, p. 40, note.

detect certain of its pathological conditions, as has been shewn by Dr. Peddie.* Dr. Bouchut has mentioned several modes of ascertaining the amount of butter contained in milk, and notices the lactometers of M. Donnè, and the butyrometer of M. Marchand with approbation. M. Le Contes' method consists in boiling the milk in a graduated tube, constricted above the middle: then emptying out a portion of the milk, its place is supplied by concentrated acetic acid, and the fluid is warmed. The caseine is precipitated, and the butter rises to the surface: if the tube be corked, and turned upside down, this change is reversed, and as the narrow portion of the tube is graduated, the amount of butter can be ascertained.†

Good milk should contain of caseine, 1.52; of butter, 3.35; of sugar of milk, 6.50; of various salts, 0.45; and of water, 87.98 parts in 100, according to Pereira.

But a still more minute examination must be made to ascertain, as far as possible, whether the nurse is suffering from any disease, local or constitutional, which she may transmit to the child. "Diseases of the skin, as the itch, and some species of tetter, have been so frequently propagated, as to become familiar to the observation of everybody; and in two instances we had the immediate care of those who had received from the nurse the most loathsome and horrible of all diseases; it was communicated not only to the children who were at the breast, but also to four older ones."‡ Rosenstein mentions the case of a family in Stockholm, in which the father and mother, three children, the maid servant, and two clerks, were infected with venereal from the nurse. I saw very lately an infant who had been intrusted to a nurse for one day, and which was then transferred to another; by the first it was infected, and it again infected the new nurse. Many such cases might be adduced, but enough has been stated to show, that any carelessness on the part of the medical attendant may inflict great injury and distress upon the infant and those connected with it.

Some light will be thrown upon the subject by a careful examination of the nurse's child, which should never be omitted. It ought to be clean, free from all eruptions (except red or white gum) about the head, neck, buttocks, and groin, and from excoriation at the different folds of the skin. Its mouth should be carefully examined and its general condition. Its flesh ought to feel firm, and it ought not to vomit more than a portion of the suck.

If we find the child and mother healthy, and if the milk be good and abundant, we may safely recommend the nurse; but as the change is very great for her, care must be taken to counteract or avoid the evils which might result from an increase in diet and a diminution of

* Edin. Monthly Journal, Aug. 1848.

† *Traité pratique des Mal. des Nouveaux nés*, 2nd edit., p. 40.

‡ Dewees, *Diseases of Children*, p. 68.

active employment. People of the class from which the best nurses are obtained suffer their share of the hardships of life. Plain, coarse food and probably a scanty supply of it, insufficient clothing, confined and uncomfortable dwellings, and hard labor, are the lot of almost all. From this state she is taken to what is to her a luxurious dwelling, with warm clothing, abundant or it may be extra diet and comparative idleness, having little to do but to attend to the infant. It cannot be surprising that such a change should in many cases be unfavorable to the health of the nurse, and that the milk should occasionally disagree with the infant. This, however, may be avoided by a little attention to diet and regimen. It is neither necessary nor advisable that a nurse should be highly fed; it will be much better to give her plain, good food, with a moderate allowance of malt liquor at dinner, and a bowl of milk or gruel at bedtime; the quantity being not much more at first than that to which she has been used. The large allowance of ale or porter so commonly given, is not only unnecessary but injurious. Daily exercise in the open air is essential, a good smart walk will promote digestion and favor the secretion of milk, if she take care not to overheat herself. The bowels should be moved every day, if not spontaneously, then by means of medicines.

It is very desirable that the nurse should be provided with sufficient occupation, and care must be taken that personal cleanliness is duly attended to. Dr. Bull recommends that sponging the whole body also with cold water, with bay salt in it, every morning, should be insisted upon if possible; it preserves cleanliness, and greatly invigorates the health.* Early habits are desirable; she should be allowed to retire early to bed, and be required to rise early in the morning.

Most of the observations here made upon the regimen and diet of the wet nurse apply equally to the mother who undertakes to suckle her child. For her, moderate air and good diet, exercise, and occupation, with calmness and tranquillity of mind, are equally necessary, but in two points she is more likely to fail. Having been accustomed to good living, in her anxiety to produce milk she will try to do so by taking more food or richer than usual, and by drinking more ale and porter, and it is very likely that in so doing she will defeat her own object. Dr. Dewees remarks, that "we have often been consulted upon the subject of the failure of the milk, when an anxious mother herself, or a hireling nurse was concerned, and been informed by them, that they had tried everything with a hope of improving it, such as rich victuals, porter, ale, beer, milk, punch, &c., without success, or it was followed, perhaps, by a diminution of it. In such cases we have often succeeded in producing a plentiful supply of milk by adopting the opposite plan of treatment; for it must be borne in mind, as an important truth, that this failure proceeds more frequently from an

* Maternal Management of Children, p. 33.

over than from an under quantity of food or of drink. It is a fact well known to all who have paid attention to the consequences of arterial excitement, that when it amounts to even a moderate degree, the milk almost immediately diminishes in quantity; and also, when the action is diminished (provided it had not continued too long) by suitable remedies, that the secretion of milk again becomes more abundant. Upon this principle we have frequently prescribed evacuants and abstinence to promote the secretion of milk.*

The other point in which the mother not unfrequently fails, is in calmness and tranquillity of mind. Having a nearer interest in the baby, she is more sensitive to its well-being, and more apt to fret if anything be wrong, and being at the same time the mistress of the family, she is more exposed to external irritations and annoyances. Against the effects of these causes she must firmly strive; knowing that distress of mind will injure her child, she must shun all occasions of irritation, and exert all the self-control she possesses.

I may as well mention here that Dr. McWilliam has introduced to the notice of the profession the leaves of the castor oil plant as a galactagogue. The leaves of the *white bofareira* are to be boiled in water, and the breasts are to be bathed with this decoction for fifteen or twenty minutes. Part of the boiled leaves are then to be spread over the breasts, and allowed to remain till dry. This operation of fomenting and poulticing is to be repeated, at short intervals, until the milk is produced or increased. Dr. Tyler Smith tried it in several cases, and the results, I think, afford ground for believing that it may be useful. A considerable amount of uterine or ovarian irritation seems to be produced, and menstruation or leucorrhœa occurred, so that, perhaps, the application may be successful as an emmenagogue as well as a galactagogue. From Dr. Rose Cormack's experiments, however, it appears doubtful whether the effects result from some special property of the leaves, or from the heat and moisture of the poultice.

Before speaking of artificial food, it will be better, I think, to conclude the subject of nursing by a few words on weaning the infant.

WEANING.

The term of nursing will depend upon various circumstances, such as the health of the child or mother, the abundance of milk, &c., &c. Some women are not able to suckle more than six or seven months, some continue for two or three years. I know a lady who nursed a child (now a tall, strong man) until he was able to draw down the blinds and bring her a footstool previous to his taking his meal. Astruc and others advise nursing for two years; Mr. Stephens mentions that the Mexicans adopt the practice, and the lower orders occasionally

* On the Diseases of Children, p. 99.

practise it to avoid pregnancy, but with only a partial success ; for we find from the investigations of Dr. Laycock and Mr. Robertson, that a large proportion of females of the lower classes become pregnant while nursing. But these cases are exceptions, and I believe it will generally be found that nursing prolonged beyond twelve months is unnecessary for the child, and positively injurious to the mother in most cases. Taking this as one extreme, we may fix the other at nine months, and conclude that it is desirable that a child should not be weaned before nine months, nor suck after twelve. By this time he will generally be provided with a sufficient number of teeth to make use of the proper food, and he will have retained the comfort of the breast until he has passed through the first trouble of teething.

However, there are circumstances which may require an earlier change ; thus, the mother's health may suffer from the excitement of nursing at the commencement, or from the constant drain afterwards. If the suckling be continued, the appetite and digestive powers fail ; severe pains in the head ensue ; the nervous system becomes greatly disturbed ; transient pains, alternating with spasmodic twitches or numbness, occur in various parts of the body ; the debility and emaciation advance rapidly ; a multitude of anomalous nervous symptoms constantly harass the patient ; a most distressing sense of sinking and emptiness is at times felt at the region of the stomach ; the mind becomes disturbed and tormented often with an intense dread of dying, or a constant apprehension of some dreadful accident. At last delirium and mania sometimes supervene. Dr. Gooch, in his valuable work, alludes to mental affections caused by nursing. I have seen such myself more than once, and which yielded almost instantly after weaning. Again an attack of acute or chronic disease in the mother, or a change in the character of the milk, may oblige us to anticipate the ordinary age of weaning ; and if the child be not too young, especially if he have teeth, and food agree with him, he may be weaned safely ; if not, it will be necessary to exchange the mother for a nurse.

If it can possibly be avoided, weaning should never take place when the infant is unwell or when suffering from teething ; a suitable opportunity, when it is free from distress, should be chosen, and it is desirable that the season should be favorable. As to the weaning itself there is ordinarily little or no difficulty with good management. The daily feeding for some time previously will have in great measure prepared the child ; and if the frequency be increased it may gradually be made to supersede nursing in the course of a week or two, almost without the child missing the breast. Or the mother may give the child suck during the night or day only. By this means the child will easily be reconciled, and the milk, the supply of which is proportioned to the demand, will gradually lessen, and at length cease to be secreted. After the child is entirely weaned, if the breasts

should continue active and uncomfortably full, the milk may easily be squeezed out, or drawn off by a pipe or bottle, or the breast pump. Some purgative medicine will be advisable.

There is occasionally a little trouble, however, with children who have not been accustomed to, or have refused, food whilst nursing. The child will be very cross and fretful, and lose some nights' rest, but if the mother persevere, hunger will conquer at last. Dr. Underwood observes: "I have remarked that infants who are indisposed to feed at all while at the breast, are nevertheless weaned, and feed just as well as others, when once wholly taken from it. There is, however, in a few children, a little difficulty for the first two or three days under any circumstance: but it is remarkable that the instance attended with the greatest aversion to common food that I ever witnessed was an infant who had been allowed a little chicken broth once a day for two months before the weaning was entered upon. The child was very healthy, slept well, and scarcely cried at all upon its being deprived of the breast, and yet would not receive the food it had been accustomed to; so that for six and thirty hours it continued averse from everything that was offered to it, though it appeared in very good humor. After the second day, however, it took a moderate breakfast, and in a little time it fed as readily as other weaned children."*

ARTIFICIAL FEEDING—SPOON-FEEDING.

The next point for us to consider is, the best mode of rearing infants by spoon-feeding, as it is termed. After what has been said, and the facts which have been advanced, showing the greater mortality of infants thus nourished, we should never voluntarily choose this method; but circumstances may occur which preclude the mother from nursing and which prevent the employment of a nurse, whether from prejudice, the difficulty of procuring one, &c. &c. No matter from what cause, if the decision be made, it is our duty to secure for the child a wise administration of proper food.

The earliest food should resemble mother's milk as nearly as possible, Mr. Pereira has given the following analysis of different kinds of milk:—

* On Diseases of Children, p. 75.

Constituents.	Cow.	Ass.	Woman.	Goat.	Ewe.
Caseine	4.48	1.82	1.52	4.02	4.50
Butter	3.13	0.11	3.35	3.32	4.20
Sugar of Milk . .	4.77	6.08	6.50	5.28	5.00
Various salts . .	0.60	0.34	0.45	0.58	0.68
Water	87.02	91.65	87.98	86.80	85.82
Total . .	100.00	100.00	100.00	100.00	100.00
Solid substances .	12.98	8.35	12.02	13.20	14.38

From this analysis we learn that women's and ass's milk are the poorest of all, but that they contain most saccharine matter,* and in choosing our substitute we should either prefer the one which approaches nearest to the natural food of the child, or endeavour to modify the differences in that we do take. Thus a large proportion of water and sugar should be added to cow's milk, a less amount of each to goat's milk, &c. Any of the milks thus modified will generally agree well with the child, and may form the staple food for some months; but feeding differs practically from nursing in this, that whilst a child will thrive upon mother's milk alone for nine months or a year, it seems absolutely necessary to change the *food* occasionally, or the child will suffer from derangement of the stomach and bowels.

Dr. Dewees has laid down some very important rules for feeding with milk, a portion of which I shall extract: 1. The milk should be pure, *i. e.*, not skimmed, nor previously reduced by water; and should be used as quickly as possible, especially in warm weather, after it has been drawn from the cow. 3. The milk should be given as soon as possible after its mixture with the water and sugar, lest it should be disposed to ferment before it is exhibited. 4. It should never be mixed but when wanted, and no more should be provided than the child will take in a short time, for it is much better to pre-

* In the 7th vol. of the *Dublin Journal*, p. 275, Dr. Moore reports an interesting series of experiments, from which he deduced the conclusion, that "the caseine of human milk forms, with most acids, two sets of compounds: the one when a certain quantity of acid is used, soluble in water; the other, when a different quantity of acid is used, insoluble in water; and that according as each experiment has formed the soluble or insoluble compound, he has reported the milk on which he operated to be incapable or capable of evaporation with acids," &c.

pare fresh than to run the risk of its becoming sour before it is used. 6. In weather that is unfavorable for keeping milk, it should be placed in the coolest place that can be commanded, or kept in often-changed cold water. 7. Should the slightest tendency to acidity be observed in the milk, it should be rejected without hesitation; nor should an attempt be made at its supposed restoration, by using an additional quantity of sugar, as this will eventually but increase the evil."*

Various kinds of food are in daily use, many of which are very valuable.

1. The most common is gruel, made from groats or prepared barley, strained and sweetened. The great mistake (if it be not in many cases wilful) made by nurses, with this as with other kinds of food, is that it is given far too thick, so that it overloads and deranges the stomach. It should, on the contrary, be made very thin, especially at first, and diluted with water or milk. When continued very long without a change, it is apt to occasion flatulence, griping, and sometimes diarrhœa; but with an occasional variation, it is one of the best, as it is the most common kind of food for infants.

2. A very nice kind of food may be made from biscuit powder, prepared rusks, or "tops and bottoms," by steeping them in boiling water, and then adding water or milk and sugar in proportion to the age of the infant; the younger it is the less milk should be given.

3. Pap or panada, made in the usual way, by soaking bread in water and adding sugar to it; but from the quantity of salt, alum, &c., used in making the bread, it is apt to disagree with the infant.

4. The best food I know, and one which I have found to agree best with my own children, is "bread jelly," and it is made thus: a quantity of the soft part of a loaf is broken up, and boiling water being poured upon it, it is covered and allowed to steep for some time; the water is then strained off completely and fresh water added, and the whole placed on the fire and allowed to boil slowly for some time until it becomes smooth; the water is then pressed out and the bread on cooling forms a thick jelly, a portion of which is to be mixed with milk or water and sugar for use as it is wanted. The steeping in hot water and the subsequent boiling removes all the noxious matters used in making the bread, and it both agrees very well with the child and the child likes it very much.

5. Arrowroot, made with water alone, or with the addition of milk, and sugar, is very good food, but as it is somewhat astringent, it is more particularly suited to cases where the bowels are relaxed. In such cases, also, boiled milk or boiled rice-milk is very beneficial.

6. "Two excellent kinds of food for infants," observes Dr. Marshall Hall, "are sago, thoroughly boiled in very weak beef tea, with

* Diseases of Children, p. 91.

the addition of a little milk ; and Leman's rusks, called 'tops and bottoms,' soaked in boiled milk. The former of these has rather a tendency to confine the bowels, and the latter to open them; they may be mixed together in such proportions as effectually to regulate the bowels."*

7. In some cases of illness, to be hereafter noticed, rennet whey or white wine whey are useful temporary additions or substitutes for the ordinary food. An irritable stomach will sometimes retain whey when it will reject milk, and wine whey is perhaps the best form of giving wine in the collapse from diarrhœa.

8. I am indebted to a writer in the *Med.-Chir. Review* for the knowledge of another species of food, viz: carrot-pap, which has been strongly recommended to the profession by Dr. Gumprecht, of Hamburgh. It is used in Wallachia and Turkey; and at the request of Dr. Gumprecht, it has been tried, and is highly commended by Müller, of Hamburgh, Mauthner, of Vienna, and Münchmeyer, of Luneburgh. The reviewer states that "Wakenroder gives the following analysis of the expressed and inspissated juice of the carrot:—

Oil, fatty, }	1.00.	Sugar, }	93.
Oil, ethereal, }		Malic acid, }	
Albumen, vegetable, 4.35.		Starch, }	
Karrotin, 0.34.		Lime.	
		Alumina.	
		Oxide of iron.	

But as the scraped root of the carrot contains other matters than the above, especially a large quantity of ligneous substance which cannot be digested: and which will often remain two or three days in the intestinal canal before being discharged, and being highly detrimental to the mucous membrane of children, it becomes important to separate that which will be useful from that which will not. Gumprecht advises an ounce of finely-scraped full-grown carrot to be mixed with two cupfuls of cold soft water, and allowed to stand for twelve hours, being frequently stirred during this period. The fluid portion is then to be strained off, what remains being pressed to yield some more. The fluid is then to be mixed with the proper quantity of biscuit powder or bruised crust of bread, or arrowroot, &c., and the pap placed over a slow fire until it begins to bubble. Care must be taken that the heating be not pushed so far as to cause boiling, or the albumen will coagulate. After its removal from the fire, it is to be sweetened with a due amount of white sugar. Dr. Gumprecht states that by mixing the carrot juice with biscuit, crust of bread or arrowroot and sugar, we obtain all the farinaceous and nutritious elements re-

* Underwood on Diseases of Children, p. 64.

quired, viz : albumen and gluten, starch, sugar, fat, and the phosphates of lime and magnesia. This food is more particularly adapted for children who have been suckled and are being weaned. For those who are brought up by hand the following preparation is deemed more advisable : an ounce of very finely-scraped yellow carrot, and two drachms of biscuit powder are to be mixed with two cupfuls of cold soft water. This must stand in a covered vessel, in a cool place for twelve hours, to be frequently stirred during that time. It is then to be drawn off or strained through a fine linen cloth. Some sugar-candy and a pinch of salt are to be added to the fluid, which may then be administered by means of a sucking bottle, care being taken that the food is at the proper temperature."

Scarcely less important than the kind of food is the quantity and the mode in which it is given. Many of the minor disorders of children arise from over-feeding, and much discomfort may be occasioned by the mode of administering it. The child should not be fed too often ; every two, three, or four hours, according to circumstances, will be often enough, and about a teacupful may be taken at a time, but the nurse must be guided in great measure by the habits of the infant, and its facility of digestion. It will let her know very clearly when it is hungry, and it is quite as easy to discover when it has had enough. Much, after all, must be left to the discretion of the nurse, but when the infant withdraws its mouth from the bottle, and shows little disposition to resume its work after being once solicited by the nurse, it will be a good general rule to conclude that it has taken as much as its constitution demands or its appetite inclines to, and no means should after this be adopted to force it against its desires.

There are three modes of administering food to the infant ; by the spoon, by the sucking-bottle, or out of a small cup. The first is the most common, and answers very well, especially when the food is thickened as the child grows older. The nurse should place the infant in a reclining posture, with its head a little raised, and the food should be poured slowly into its mouth. If it be poured too rapidly, it may be drawn into the opening of the larynx, and the child be in danger of choking.

The best imitation of the natural process is the use of the bottle, as the child, obtaining its food by suction, can regulate at will the rate of supply, but it is only practicable whilst the food is thin. The only care, beyond cleanliness, required, concerns the nipple ; it may be formed of chamois leather, in shape and size like the little finger of a glove, with a perforation in the end, and it should be changed every time it is used ; or a prepared calf's teat may be tried, and this I think better, as it has more firmness, and does not collapse and close from the pressure of the infant's mouth, which the chamois leather is apt to do unless prevented by the insertion of a small piece of sponge. After each feeding, the teat should be removed, rinsed, and put into spirits of

wine and water until again wanted, and the bottle should be washed carefully with hot water. It is of consequence that the nipple (whether a teat or of leather) should be so long as to prevent the gums of the child coming in contact with the bottle neck; the infant, it must be remembered, does not suck with the front of its mouth, but mainly with the back part.

As a substitute for chamois leather or a calf's teat, M. Dardo, of Paris, has invented a nipple of thin elastic cork; and some one else, whose name I do not know, one of ivory, from which the earthy matter has been removed, and which is flexible and elastic. I have tried them both, but have not found them so satisfactory as the calf's teat; they appear to me far too short.

In some cases the child may be fed from a small cup, with its edge gently inclined to the mouth; the infant will partly suck, partly drink its food. All children will not do this, but I have seen it adopted even from the birth, and it appeared a very good method; the infant took its food quietly, and without the fretting which frequently accompanies spoon-feeding, and without the risk of a sour nipple from the carelessness of the nurse. It is very necessary, however, to be careful that the food is not poured too rapidly into the mouth.

Either of these methods will answer very well; it is of more importance to impress upon the nurse that the infant is not to be fed too often, nor too largely at once (though this error will generally be remedied by the stomach rejecting the surplus), nor to have the food too thick whilst young. The food must be gradually increased in substance as the child advances in age, and then the sucking-bottle must be laid aside. If possible, at any rate in the daytime, the food should be fresh made each time, and the vessels used carefully washed afterwards. In order that these matters be properly attended to, it is absolutely necessary that the mother should keep a vigilant supervision over the nurse and nursery. Common sense and the tact which is acquired by experience, will very soon afford her sufficient guidance.

As the infant grows older, the diet will admit of extension and require a change. After the sixth or eighth month, although farinaceous food will constitute the bulk of the nourishment, we may allow chicken broth or beef-tea occasionally for dinner, or an egg by way of variety. Until the child is prepared with teeth to masticate solid food, we may fairly conclude that such is not its natural food, and whatever is unnatural is certainly mischievous with children. Dr. John Clarke wisely observes: "If the principles already laid down be true, it cannot be reasonably maintained, that a child's mouth without teeth and that of an adult furnished with the teeth of graminivorous and carnivorous animals are designed by the Creator for the same sort of food. If the mastication of solid food, whether animal or vegetable, and a due admixture of saliva, be necessary for digestion, then solid food

cannot be proper where there is no power of mastication." A crust of bread, rather tough than crisp, for the child to suck, is of great use not only in amusing it, but in preparing the gums for the exit of the teeth; it is far better than rings and corals, and such like.

Bread and milk early in the morning, or, if the child be old enough, a little bread and butter and a drink of milk, will be necessary to satisfy the first demands of the appetite; afterwards, at a convenient time, the breakfast may consist either of bread and milk or bread and butter, with milk and warm water and sugar.

Dinner, which with all children should be early, may consist of chicken, mutton, or beef broth, every day, or alternately with farinaceous food, as may seem best. If there be much irritation with the teeth, the broth had better be suspended. When the child has teeth to masticate it, a little solid food may be given, such as chicken or mutton chop, alternating with dinner of egg and bread, potatoes and milk, stirabout and milk, simple puddings, &c. The only drink allowable is water, or milk and water.

The supper should be taken about six or seven o'clock, and may consist of the same food as the breakfast; and very soon afterwards the child should be put to bed.

Although it is well to make regularity as to meals the rule from the earliest age, yet it is a rule which admits of many exceptions. If the child complain of hunger between meals, he will be glad of a piece of bread or a biscuit, and to such deviations there can be no reasonable objection; but if the pretended hunger be only for "nice things," we may safely refuse. No doubt, simplicity of diet and regularity of living are essential to the well-being of children, but yet it is quite possible for parents to be too particular and restrictive. I am satisfied that a foundation is often laid for epicurism and gluttony in after life by the habit of allowing children to see dainties on table of which they are not permitted to partake. They naturally value unduly that which they see others enjoy, and the more that it is forbidden to them. I confess, for my own part, that I do not think a moderate allowance of fruit, pastry, or sweets, to a child above two years old, will do it any harm, and I know that such an indulgence prevents them seeking to gratify their appetite in an illicit manner. Except on extraordinary occasions, it is much better to have nothing brought to table of which the children who dine there may not take their share. A little self-denial, if it be such, is surely better than the risk of physical or moral injury to one's child.

On the other hand, the practice of giving a young child a taste of everything it may fancy—cakes and sweetmeats at all hours and in improper quantities—is a monstrous invasion of nature, which will inevitably entail its own punishment in delicacy, ill-health, and suffering.

After the third or fourth year the diet of the child gradually approximates to that of the adult; he takes a mixture of animal and

vegetable food in such proportions and quantities as are suitable to his age, constitution, and appetite: and the intervals between meals lengthen. There is one article of diet which, under ordinary circumstances, should be prohibited to children under fifteen or sixteen years of age. I mean wine or malt liquor. Neither are at all necessary, as their digestion requires no stimulus, and reparation is effected perfectly by food and rest. To accustom children to them is, to say the least, a very bad habit, and it may have very injurious consequences.

CHAPTER IV.

CLEANLINESS.—DRESS.

It can scarcely be necessary to impress upon my professional readers the necessity of cleanliness and thorough ablution, but it is very desirable to impress upon mothers the necessity of their seeing that this is observed. Not merely does careful washing cleanse the skin from impurities, and prevent the irritation which might arise, but it is in itself of the greatest value in promoting health. "I consider bathing," remarks Struvè, "as the grand arcanum of supporting health, on which account, during infancy, it ought to be regarded as one of those sacred maternal duties, the performance of which should on no account be neglected for a single day."

I have already spoken of washing the infant at birth in warm water, and this practice must be continued daily. Dr. Armstrong and others, advise the immediate or speedy use of cold water, but in my opinion this is a practice utterly indefensible. It causes a great shock and much distress to the child; the circulation is disturbed, and may not easily regain its equilibrium; and there is very great chance of cold. Dr. Merriman remarks: "so many instances have occurred within my knowledge, of cold bathing, improperly and injudiciously adopted, having been productive of serious ill effects, that I should ill perform the duty of an editor did I not caution my unprofessional readers to be extremely circumspect before they adopt the use of so powerful an agent as the cold bath, not only as regards infants, but children further advanced in life."

Each morning the infant should be well washed all over with a soft

sponge or flannel, and warm water, and in the evening at least partially so, before putting it to sleep, after which it should be carefully dried with a soft towel. Particular care must be bestowed upon those parts which are liable to friction, as the folds of the groin and buttocks, the armpits, the creases of the neck, &c. &c.; after drying them well, they are to be powdered with *starch* or *lapis calaminaris* or *lycopodium*. Very little soap will be necessary, and it should not be applied to the face at all, because of the risk of its getting into the eyes. Great gentleness is necessary in both washing and drying, as the skin is extremely tender, and easily irritated. Properly employed, friction along the back and limbs is both pleasant and beneficial.

In addition to these regular and stated washings, the nates should be washed and powdered after each movement of the bowels, in order to escape excoriation. Moreover, the nurse should watch the infant carefully, and change the napkin as soon as it is wet, or after the bowels have been moved; and as the child grows older it may be taught to intimate its necessities to the nurse. Allowing the child to remain with a wet napkin about it, is to expose it to cold, excoriation, and distress, to escape a little trouble. "But it should be well understood, when we speak of keeping the child clean, that we do not consider the repeated application of the same diaper, because it has been hung in the air, or before the fire, and dried, as coming within our direction. There can be but two reasons for this filthy practice, —laziness and poverty. The first should never be considered as a valid reason for employing the same diaper several times, nor will it, perhaps, ever be urged as one in direct terms; but it is unquestionably the only one that influences upon this subject, when the second does not obtain to render this, even in appearance, excusable. If the second reason exist, and the child has not a sufficient change, it were much better that it be without a diaper from time to time, than have those returned to it, stiffened with salts, and reeking with offensive odour."*

I would wish to add a word with regard to the powder, *lycopodium*, which I have recommended, and which I have found most useful. Its peculiar quality is that, when dusted over a surface, water runs off from it without wetting the surface, so that, for some time at least, perfect dryness is preserved. For children with delicate skin, liable to excoriation, nothing can be better, and I have repeatedly seen severe excoriation disappear in a few days under its use.

For the first few days care must be taken not to disturb the remains of the navel-string during washing. After the washing is over, the rag which envelopes it may be changed if necessary, but no effort should be made to hasten its detachment, as the consequences may probably

* Dewees, Diseases of Children, p. 88.

be unmanageable, and even fatal. It will fall naturally about the fifth or sixth day, and then a little scorched rag, or spermaceti spread on linen, may be applied. If the navel be red and swollen, a little bread poultice may be applied.

When the child is three months old it will be able to bear cold water in washing, if it be healthy, and will be greatly refreshed by it. In order to obtain the greatest benefit from it, the washing should be concluded quickly, and followed by rapid and gentle friction with a warm towel. Or, instead of deliberate washing with a sponge, a cold bath may be given every morning, provided that it be not winter, and that a proper degree of reaction takes place immediately after, and that the child is not frightened. I know of no good to compensate for the convulsive screaming and extreme distress which some children exhibit on being put into a bath. Dr. Marshall Hall observes: "The bath should indeed never be used so as to leave an impression of coldness, or actual loss of warmth, or lividity of any part of the surface. And when we consider how readily infants lose their temperature, and how slowly they regain it, we shall view the cold bath as one of those measures requiring great precaution in infancy. The best kind of bath is a shower bath of great simplicity. It consists of a tin vessel in the form of a large bottle, pierced at the bottom like a cullender, and terminating at the upper part in a narrow tube; when put into water it becomes filled with this fluid, which is retained by placing the finger upon the tube; on removing the finger the water flows out gradually. The quantity and temperature of the water must be proportionate to the age and powers of the child, the weather, and the season. It should be warm or tepid for infants at first; afterwards it may be used a little cooler. Its tonic effect may be augmented by the addition of bay salt, and by much active rubbing. The first few baths may be quite warm, and make a sort of commencement, until the infant is familiar with the little shower. It may gradually be made a remedy."

As the child advances in age, some modification of the general ablution becomes necessary, but great care should be taken to insure sufficient and frequent washing, even after it has become able to wash itself. A large, shallow tub, in which a child can either sit or kneel, is an admirable appendage to a nursery. It is rather an amusement to the child, and insures a thorough washing, and may be continued long after he is able to wash and dress himself. In addition to general ablution at this period, a little extra attention must be bestowed upon the hands, face, ears, hair, &c.; and it is of great consequence, in doing so, to inculcate upon the child itself *habits* of cleanliness, so that it shall not be a task to be washed and clean, but a pleasure. It may be made a *sine quâ non* that the child shall not appear in the family unless with proper attention to its person; and that which at first is irksome soon becomes associated with the pleasure of staying with its parents.

Careful attention should be paid to the state of the hair and scalp.

At first it is of course washed all over every day, but after the child is a year old, once a week or fortnight will be sufficient, if it be well brushed night and morning. Soap will be necessary in washing, or the yolk of an egg, which is much better, and leaves the hair beautifully soft and clean.

A good deal of trouble is sometimes occasioned by the scurf which accumulates on the top of an infant's head, and the effort made to remove it by means of a small comb only make it worse, from the irritation it causes: the best means I know is rubbing a little pomatum gently over it at night, and washing it off with mild soap and water or oatmeal and water, or yolk of egg, in the morning.

Boys' hair will of course be kept short, and perhaps little girls' hair would be none the worse for being so; but this is a point which every mother will decide for herself, independent of medical advice; and provided that the increase of care as to cleanliness (washing and brushing, &c.) keep pace with the increase of its length, I should not be inclined to interfere.

DRESS.

In connexion with what has been said of cleanliness, it may be observed that the inner and outer garments of an infant should be changed every day at least, and that the oftener they are changed with older children the better. It would be better for the health and comfort of the child if the money that is expended upon *fine* clothes were employed in augmenting the number of its under garments, so as to facilitate repeated changes.

During infancy, the principal object of dress is to protect the infant from cold, yet we constantly see this end overlooked for the sake of fashion or preconceived opinions. Parents are but slightly aware of the suffering and injury which may result. Dr. Edwards, in his admirable work, *On the Influence of Physical Agents upon Life*, remarks, that the mortality from cold "is not confined to children whom the misery of their parents cannot guard from the rigor of the weather, but it operates, to a great extent, without being either perceived or suspected, in families enjoying affluence, and in which it is believed that the necessary precautions are taken; because, cold being relative, it is difficult from our own feelings to judge of its effects on others, and because it does not always manifest itself by determinate and uniform sensations. They do not feel the cold, but they have an uneasiness or an indisposition which arises from it; their constitution becomes deteriorated by passing through the alternations of health and disease; and they sink under the action of an unknown cause. It is the more likely to be unknown because the injurious effects of cold do not always manifest themselves during, or immediately after its application: the

changes are at first insensible; they increase by the repetition of the impression, or by its long duration, and the constitution is altered without the effort being suspected."

Admitting the truth of this statement, we may lay down the essential qualifications of an infant's dress to be *warmth, simplicity, and ease*. The instinct of animals provides the former for their young, and both reason and observation concur in its greater necessity for the infant. If the dress be complex, it will be the source of great inconvenience to the mother and nurse, and render dressing and undressing a period of torment to the child; and if, in addition, part of it be tight, or undue pressure be made by it, more serious injury may be inflicted. I have already given the description of the swathing of infants in France, according to Buffon, of which the great excellence seems to be so to fix and restrain the child that it can neither move hand nor foot, nor turn its head. At first one is inclined to disbelieve this, or to fancy it a story of ancient times, but I remember within thirty years seeing a child thus fastened and bound in Paris. That French children so treated grow up into healthy and graceful men and women, is no more an argument in its favor than the custom of squeezing the heads of Carib children, which does not apparently enfeeble their brain in after life. The question is, not how far we may interfere with, or trespass upon nature, but how we can best aid, or at least, not impede her efforts. We *may* do either, but we are accountable to our children and to society for the use we make of our power.

It is obvious that the materials of dress ought to vary according to the climate and the season of the year, but yet the difference should not so great as in the dress of adults. A considerable difference should be made between its night and day dress.

A broad binder of fine, soft flannel is first swathed firmly, but not tightly, around the child's body, and then comes a little shirt of lawn or French cambric. Condie and others recommend that a flannel dress should be always next to the skin, but this appears unnecessary, at least in this country; it is certainly more apt to irritate the delicate skin of an infant, and unless it be changed every day, as the inner garment of the infant ought always to be, it is much less cleanly. After the shirt will come long flannel petticoats and other articles of dress, of divers fashions, according to the customs of the country, and lastly, the frock or robe. All these should be long, easy, and warm, so as to protect the infant from cold, and yet leave it as much freedom of movement as is necessary. The sleeves of the frock should also be long. As far as possible the dress should be fastened with strings instead of pins; and when the latter are indispensable, large pins are better than small ones, as being much less liable to fall out or to prick the child. Some authors have recommended that the infant should not wear a cap, and some time ago this practise became for a short time the fashion; experience, however, has proved the folly of this attempt at braving natural laws to gratify a theoretical prejudice. In this and similar

ways, I dare say a *race* may be hardened, but it is by cutting off the weaker members.

The cap should be made of warm, soft material, fitting nicely, so as not to press upon the head, and in tying it care must be taken that the string neither chafes the skin nor impedes respiration. As the infant grows older the material may be lighter, until at six or eight months, if the weather be mild, it may be laid aside altogether.

“As a general rule, the clothes worn at night should be both lighter and looser than the day clothes. The additional warmth produced by the bed and its coverings render unnecessary the same amount of garments as are required during the day, and would be liable, were no change made, to overheat the body, or to exhaust it by causing profuse perspiration; while the least restraint or compression of the limbs, chest, or abdomen, renders the sleep disturbed, and, by its impeding the free action of the heart and lungs, is liable to produce various uneasy sensations or even partial or general spasms. Every article of dress worn during the day should be changed on retiring to bed; this is demanded for the promotion of the comfort as well as the health of children; it allows the different portions of the clothing to be aired at short intervals, and prevents any injury that might result from the gaseous and vaporous exhalations given off by the skin, and imbibed to a greater or less extent by the clothes, being retained too long in contact with it.”*

Dr. Dewees with his usual good sense, recommends “every mother with her first child to try her skill daily at washing and dressing her infant, a week or ten days before her nurse leaves her, that she may become familiar with the routine, and gain a little experience in the method. Indeed, this cannot be too seriously recommended; the mere handling of the child requires, to do it in the best manner, some experience: a mother may learn much as respects this from a handy, experienced nurse, and will be amply repaid for looking on during the operation.”†

I would add to this, and especially during the first year, that the mother ought repeatedly either to wash her babe herself or to be present the whole time; this will insure cleanliness, and be a check upon the carelessness and slovenly habits of the nurse, and it applies with equal force to the process of dressing as of washing.

As the child grows older its dress will undergo several changes. At five or six months, if the season be suitable, its clothes may be shortened; and at the end of the year they may still be further reduced, so as to allow of greater freedom of motion.

After this the dress remains pretty stationary for a time, and then assumes the character proper to little boys and girls. The same prin-

* Condie on Diseases of Children, p. 43, 4th edit.

† Diseases of Children, p. 97.

ciples should regulate it throughout ; warmth in winter, lightness in summer, simplicity and freedom. The entire person should be well covered ; the child should be early taught to dress himself wholly or in part ; and there must be no restraint or undue pressure by strings, or straps, or waistbands. Any attempt to reduce the rounded form of a young boy or girl to what fashion has pronounced to be a good shape will be exceedingly mischievous to the framework of the body and to the organs it contains ; and, instead of a graceful, free-moving child, we shall produce an abortive imitation of a man or woman, lacking the grace of one and the ease of the other.

I have already objected to the use of flannel next to the skin in infants, but what I then said does not apply to older children. In so variable a climate as this, a slight waistcoat of thin, fine flannel, put on in November and left off in May, I have found of the utmost service in protecting from colds ; it should, however, only be worn during the day.

The same principles ought to be the guide of every sensible mother as to the dress of her daughter until the bodily development be complete. Scrupulous cleanliness, thorough ablution, frequent changes of comfortable clothing, no undue exposure of neck, arms, or legs, and an entire avoidance of unequal or undue pressure by corsets, shoulder-straps, tight shoes, &c. The only way we can assist in forming a really fine figure is to remove all restraint, and secure, as far as possible, so free an action to the muscles as will lead to their perfect development.

CHAPTER V.

AIR AND EXERCISE.—SLEEP.—MEDICINE.

PURE fresh air, of a proper temperature, is essential to the health of the infant; but for some time this must be obtained without leaving the house. For some days the baby should be kept in its mother's bed-chamber, and that should be well ventilated; the second or third week it may be taken into the nursery during the day, and subsequently to other warm, ventilated rooms in the house; this will afford sufficient change of air.

The period at which it may be taken out of doors will depend partly upon the weather and partly upon the constitution of the child. If the infant be strong, and the season fine and mild, it may be carried out, well wrapped up, and shielded by the nurse's shawl or cloak, soon after the completion of the first month; if the weather be severe, this must be postponed until it becomes more favorable. But if the infant be delicate, we must be more cautious. Sir James Clarke, in his valuable work on Consumption, remarks: "A delicate infant, born late in the autumn, will not generally derive advantage from being carried into the open air in this climate until the succeeding spring; if the rooms in which he is kept are large, often changed, and well ventilated, he will not suffer from the confinement, while he will probably escape catarrhal affections, which are so often the consequence of the injudicious exposure of infants to a cold and severe atmosphere."

Whilst the child is out, the nurse should constantly walk about; most of the colds caught by infants arise from her loitering about, sitting down, or standing to gossip with her friends. Nothing so tranquillizes an infant as a walk in the open air; it generally sleeps nearly the whole time, and few things so materially promote its health and strength.

But although I have spoken thus favorably of fresh air, let me not be supposed for a moment to sanction the indiscriminate exposure of even healthy children for the purpose of hardening the constitution. Nothing can be more senseless than such a delusion, except the arguments brought in favor of it. The infants of uncivilized nations are exposed from birth, and survive. But we are not told how many die; and, moreover, we are not savages, and our climate is severe. The children of the poor are hardy little fellows. Yes, those that survive; but we *know* that a large proportion are destroyed by this very exposure. There are no finer men than the Highlanders of Scotland, and yet their children are exposed at an early age to all weathers. But many die, and it has been truly remarked that of large families it is rare to find more than two sons reared to manhood.

We may leave such arguments as these, and attend to the experience of Dr. John Clarke and Dr. Merriman, who were more conversant with the habits and diseases of children than most of their contemporaries. The former observes: "It is a subject of very common observation, that children who have been inured to cold and brought up hardily (as it is called), are the strongest in adult age; and this has induced many parents to expose their children, thinly clad, to all the severities of weather. It is in part true, since children who survive the seasoning are generally strongest. The original strength of their constitution probably enabled them to bear it in the first instance; and if they are able to encounter it in early life, they will lose in some measure the susceptibility of being readily affected by changes of temperature afterwards. But all medical men who have had opportunities of attending much to the diseases of children must have observed that those families in which children are least exposed to cold in winter are generally most healthy, whilst those who act on the erroneous principle of hardening them, by the exposure of their tender bodies to severe weather, are scarcely ever free from disease of some kind. Disorders which might otherwise have remained dormant are thus brought into activity by this mode of treating children; and many fall sacrifices to pulmonary consumptions and scrofulous complaints in more advanced life, from this error alone, of being exposed in childhood to cold with the intention of being made strong and hardy. The present fashion of clothing young children, founded upon the same erroneous notion of hardening them, is also very injurious to their health. Their arms and chests are entirely uncovered. They generally wear no stockings at all, and from the stomach downwards they are almost in a state of nakedness even in winter."* Dr. Merriman remarks: "I am afraid that Dr. Underwood's strongly expressed opinion of the absolute necessity of inuring very young infants to endure the cold air, as essential to their health, supported as it is by other popular writers, has been productive of great and extensive mischief." "True it is that some very robust infants endure the cold in a very remarkable manner, and these are often quoted as examples of the benefit to be expected from the hardening system; but a wise man will be cautious how he follows that as an example, which is mentioned only because it is extraordinary. The rules which are to guide our practice should be drawn from what is usual, not from what is uncommon; yet we are too often led away to imitate what is marvellous and despise that which is more accordant with nature's laws and precepts. Thus, on the evidence of one strong vigorous infant, the hardening system is applauded and adopted, and we neglect to inquire what numbers have sunk into the silent grave, in the vain

* On the Diseases of Children, p. 9.

attempt to render them, by exposure to the cold, equally vigorous and robust."*

During infancy the only exercise is of a passive kind, owing to the delicacy of the organization at that period; and yet exercise is as essential then as afterwards, and this will be obtained by being carried about the room in the nurse's arms, not sitting up, for which its back and neck are too weak, but in a horizontal or reclining position. When the child acquires sufficient strength, it may be allowed to sit up, and take its exercise in this posture. The nurse should be accustomed to carry the infant on either arm alternately, for otherwise it may acquire a species of deformity from the habit of leaning always to one side. Another kind of exercise highly useful to infants consists in gentle friction to the back and limbs, which may be applied night and morning in the nursery, taking care that there is no undue exposure to cold.

A very common custom of giving the infant of some weeks old exercise, is by tossing or hoisting it, and no doubt most children like it very well, but care should always be taken not to do it too violently, as great mischief may result. Moderate tossing, with a gentle, equable motion, and swinging backwards and forwards, is both pleasant and useful, if it be continued for a few minutes only at a time.

I agree with Dr. Combe in strongly objecting to the nurse lifting the infant by the arms, as is so commonly done. The sockets of the joints are very shallow in infancy, and the bones so feebly connected together that dislocation or even fracture may be the result. The nurse should place a hand on each side of the chest, under the arm-pit, and so raise the infant.

When the infant is a few months old, it will voluntarily extend its exercise by an almost constant movement of its limbs, in which it evidently finds great delight. At this time it may be laid on a bed, sofa, or on the carpet, and allowed to exercise and amuse itself; the comfort of a habit of this kind will be equal to the mother and infant; and nothing will so tend to induce a child to creep about. I have remarked that children who commence progression by creeping suffer far less from falls afterwards than those who commence by walking with assistance. When assistance is afforded it should be done very cautiously, so as not to induce the child to make exertions beyond its strength, nor to prolong them too much.

Dr. Combe observes very truly, that, left to creep about by itself, "the infant will be much better strengthened, and learn to walk much sooner, and with a more free and erect carriage, than if prematurely set on its feet and supported either by the arm or by leading strings. The chest, also, will be more fully developed, and the whole system

* Underwood, pp. 43, 44.

consequently benefited. With moderate caution on the part of the attendant, there is nothing to fear in thus indulging the infant, for it is even amusing to see how careful it generally is about its own safety, when left to itself. When a mother takes the entire charge of the exercise of an infant, and judges of its risks by her own excited feelings, she is sure to err. But remove all external sources of injury and leave the child to its own direction, and it will very rarely hurt itself by its own procedure. It will crawl till its bones become firm enough to bear the weight of the body, and its muscles powerful enough to move them.”*

Mothers and nurses are so proud of a child being able to walk at an early age, that they are apt to place them on their feet and (with more or less support) keep them moving about in that way before the legs have acquired sufficient strength; and in many cases the result is actually to defer the period of walking alone, and perhaps to give a curve inwards or outwards to the legs. We may be very certain that, when a child is able to walk, he will show his ability in a way that cannot be misunderstood, and then a little help, rather to enable him to balance than to support himself, will be sufficient. Remembering that walking alone requires not merely physical strength but the power of balancing, we should be cautious of forcing a child to step alone until the latter as well as the former has been acquired. Timid children attain the latter very slowly, and if they are forced, the fear of falling will prevent their making the attempt, and will only serve to distress them. I would say, then, that the child should itself decide upon the different steps of its progress; and a little watchfulness on the part of the mother or nurse (if she be a mother) will easily discover the indications.

It is, of course, necessary to watch that the child do not hurt itself in its earlier efforts, and as far as possible to guard against falls; but over-anxiety on this point may injure the child by destroying his confidence. A few falls on the ground will do no great harm, and will probably convey a useful practical lesson to the infant. Certain it is that, left to themselves, they do display a wonderful degree of care and judgment in taking care of themselves. “An instance is given of a child (in the backwoods of America) under a year old being seen crawling on all fours along a sadly mutilated bridge, with a roaring stream flowing under, within sight of the mother’s house, where she was quietly engaged in washing, and not troubling herself about the apparent danger which startled the traveller so much. On the latter expressing his alarm, the mother quietly replied, that the child was accustomed to take care of itself, and knew well what it was about; and then made him observe the deliberate and cautious way in which it made even the slightest movement; adding that, to run anxiously

* On the Management of Infancy, &c., p. 269.

to its assistance, would be the sure way to frighten it and make it drop into the water. There may be exaggeration in this anecdote, but assuredly the principle upon which the mother is stated to have acted is sound, and might advantageously be carried out in practice much further than it has ever generally been.”*

Such exercise as I have described, with a walk once or twice a day, when the weather is fine and temperate, or a change of apartments when the weather is unfavorable, will be sufficient during the first twelve or eighteen months.

But as the child increases in strength, air and exercise become even more indispensable; in fact a child from two to ten or twelve years will be almost always in motion, and cannot have too much fresh air, provided there be no undue exposure. The child should be allowed (within certain wide limits) to choose the mode and amount of exercise; if unrestrained, he will rarely exceed the bounds of reasonable fatigue, and a free unfettered use of each portion of the body will best promote health and gracefulness of carriage. I scarcely know anything more unnatural than the strings of unfortunate school-children taken out to walk for exercise, and obliged to put in practice the orthodox rules of turning out the toes, keeping the step, walking uprightly and holding up the head; and at the time envying every little child whom they see scampering about as nature intended.

If, however, the child be too delicate to take sufficient exercise on foot, it may obtain both air and exercise, the more necessary on account of its delicacy, by means of a donkey or pony, with amusement and gentle excitement in addition. Exercise on horseback is particularly good for children of both sexes with delicate lungs, as they grow older; not merely do they obtain an equal amount of air and exercise, but they breathe purer air, and derive peculiar benefit by passing rapidly through it.

Up to a certain period girls and boys share their plays and exercise and walks, together, and it is far better that the former should be allowed as much liberty as the latter, than that they should be prematurely confined. The time, however, will come when the association of brothers and sisters, will, to a great degree, be broken. Boys, however, will obtain sufficient air and exercise for themselves, and even the madness of parents for the precocious advancement of their sons will hardly obstruct this. Any one who is so deluded as to force forward the intellect of his son should remember that he can only do so at the expense of health; that the deprivation of adequate air, exercise, and play, will be followed by a delicate, enfeebled manhood and probably by a premature death.

But little girls are more frequently victimized. From the moment

* Combe on the Management of Infancy, p. 272.

of her separation from the sports of childhood, the great object is to make a little woman of her. Her mind is crammed and confused, with a little of every kind of knowledge; and her body cramped and confined by stays and the endeavour to maintain a womanly carriage; and her feet are cased in tight shoes, so that the pleasure of free movement is not only forbidden but destroyed. And the result is not grace but formality. Grace cannot exist without freedom, and the tutored effort to be graceful or ladylike is necessarily destructive of success.

Little girls, as they grow up, may very properly be restrained from boisterous plays, but at the same time free air and exercise should be secured for them, without the inconvenience of tight dress. A brisk walk, a race after a hoop, or a canter on a pony, will give bloom to the cheek, and brightness to the eyes: and the structure of the body being well developed and allowed free play, easy and natural grace will be the consequence.

One word as to the exposure of the child to *light*. Light is the natural food of the eye, and within certain limits it is pleasant and agreeable, but it requires regulating according to the age. During early infancy the eyes should not be exposed to a concentrated or strong light. The light of the sun may be tempered by window-blinds, and the infant need not be held near to a lamp or candle. But after a while the eye becomes accustomed to light, and whilst we still avoid the extreme I have mentioned we should equally avoid the opposite. A dark, dull room, or one from which light is more or less excluded, is injurious to the eyes, health, and spirits, of children. "Every one is aware," says Dr. Combe, "that vegetables are blanched by the exclusion of light, and that corn, growing even under the shade of a tree, is paler, sicklier, and later in ripening, than that growing in the open field; but we do not keep sufficiently in mind that on man the operation of light is scarcely less striking. Deprived of its wholesome and enlivening stimulus, he becomes pale and sickly in appearance, his blood is imperfectly oxygenated, and a proneness to disease or debility arises. Of these results we find numerous examples in the narrow lanes and dark cellars of every large town, and in the members of the sedentary professions, and others rarely exposed to the full light of day; and especially in children we see them all in an aggravated degree." Plenty of cheerful light, when the child is awake, then, is essential, and it is equally so to moderate or exclude it during sleep. Too much light then will not merely prevent or interrupt sleep, but may act as a very injurious stimulus to the eyes and brain.

SLEEP.

For some weeks after birth an infant's life is divided between feeding and sleeping; it awakes when hungry, and falls asleep again when satisfied; and in this there is a great advantage, not merely by facilitating digestion, but by the repose afforded to the brain and ner-

vous system. There should be no attempt to interfere with this, for the more the infant sleeps the better ; but by degrees its wakeful moments lengthen, and, as it is very desirable that these should occur during the day rather than the night, some little effort may be made to attain this.

At first, and for some months, the child should sleep with its mother, both on account of the greater warmth to itself, at a time when it needs it most, and for the convenience of the mother who is thereby saved the necessity of rising to attend to her child. This, at least, is the natural way, and unless there be some special obstacle, I should regard it as an imperative duty, although it is a very common practice to let the nurse-maid take the infant to the nursery, and feed it during the night, from a dislike, apparently, to be disturbed. As for any danger to the child which the mother may fear, that clearly must be greater with a hireling than with the mother, whose maternal instincts are on the watch. If the infant be placed with its head resting on its mother's arm it is all but impossible that it should slip down, or be in any danger of being overlaid. Care should be taken not to cover it too heavily or too closely with the bed-clothes.

As the child grows older, it may be left in its cradle the first part of the night, until it requires to be nursed, and then be taken into bed to its mother ; but when weaned, it should be accustomed to sleep altogether by itself.

The head of the cradle should be lined, to guard against draughts of air, and the bedding should be warm and soft, without being too soft, or the bed-clothes too heavy or too warm. The infant should be carefully placed on its side, with its limbs free and its face uncovered, so as to allow free access of air. The less effort that is made to put the child to sleep the better ; when sleepy, it will generally be sufficient to place it in the cradle or bed, and keep the room still and dark. Without precisely objecting to rocking or hushing the infant to sleep, I have no hesitation in saying, that much trouble is saved to child and nurse by accustoming it to go to sleep without it, and because it is placed in bed. Young children are so completely creatures of habit, that anything may be taught them, and it is better that they should be taught good and regular habits than the contrary. The advantage of the plan of which I am speaking is seen peculiarly during sickness, when the child will be fretful, and require much more than the ordinary coaxing to sleep, if it have been accustomed to it at all.

Gradually the amount of sleep during the day diminishes, but for three or four years a child is greatly benefited by an hour's sleep in the middle of the day, and this is a habit which should be encouraged and prolonged as much as possible ; for during waking hours children expend far more vital energy than adults, and a midday sleep recruits them, and prevents them being over-fatigued and fretful in the evening. For this reason, also, children should be put to bed early ; during the first year or two, half-past five, or six, and for five or six years more,

seven, or half-past, is quite as late as they ought to be allowed to stay up; the worn, weary look of children who sit up late is a sufficient proof of its injurious effects.

Besides, children are morally and physically the better for acquiring early habits; but a child cannot rise early who goes to bed late. Ten hours' sleep are barely enough for a night's rest for a child; and nothing should induce parents to shorten a child's full allowance of it. For this reason a child should not be awoke in the morning, but simply sent to bed earlier at night, and it will awake itself. Once awake, it should, if possible, be washed and dressed immediately, as lying in bed awake, merely promotes indolent habits without any benefit to the health. Regularity of habits may be applied to sleeping quite as much as to eating or any other natural operation, and it is no less desirable for the comfort of mother and child.

But what is to be done when the child is restless, and will not sleep? we are often asked. Can you not give it something to make it sleep? Certainly; but the question is, *ought* you to do so; and I would unhesitatingly answer in the negative. At proper intervals, it is natural for the child to sleep, and it will do so if there be nothing preventing it; our duty, therefore, is to find out the obstacle and remove it. The child may be placed uncomfortably in bed: there may be undue pressure upon some part; the bed may be rough and uneven; its feet may be cold: it may have eaten too much; or it may be teething. Any of these circumstances will make the child fretful and restless, and they must be relieved; if none of them exist, the child must be unwell, and should be treated accordingly, but not dosed with laudanum, syrup of poppies, Godfrey's cordial, or any of the mischievous remedies which nurses are too ready to employ. If the child be really restless and uneasy, without ascertainable cause, it may be put into a warm bath for a few minutes, which will soothe it, and often cause it to fall asleep.

When the child is up and dressed, its night-clothes and bed-clothes should be exposed to the air, as the effect of fresh coverings is extremely soothing and healthful.

MEDICINE.

Very few words will comprise all I have to say on this matter, because I think that the less medicine a child takes the better for his health; *i. e.*, so long as the child is in health, the natural functions will be performed, according to his constitution, without medicine; and if the child be sick, the less tampering with medicines by mother or nurse the better. A mistake has arisen from the notion that the constitution of all children is alike and that their evacuations ought to be alike, whereas nothing can be more erroneous. An infant's bowels are moved four or five times a day ordinarily, gradually diminishing in frequency, as the child grows older, to three, two, or one evacuation

per diem; but we are not to insist upon this as an invariable rule, and administer medicine until it is complied with. In the case of one of my own children, and one of the most healthy, the bowels, after the first few weeks, were only moved once a day, and he took no medicine from the first dose of castor oil until he was nine months old, nor had he one hour's sickness.

A dose of castor oil is usually given at birth, and may be repeated, if necessary, until the meconium is cleared away. After that, nature should be allowed fair play, and medicine should not be given unless there be sufficient reason. If the child appear uneasy and hot, and the bowels be confined, a dose of castor oil, magnesia, or rhubarb may be given, or a warm bath; but if the child exhibit no signs of suffering, why should we interfere?

There is, however, one exception to this rule, and that is, when the child is teething; at this time a certain amount of irritation is excited, which, if it localize itself in any organ, may prove highly injurious. The most common and least mischievous accompaniment is a bowel complaint, and, to prevent a worse evil, it is advisable to determine to the bowels by an occasional dose of medicine.

To children who suffer much from flatulence, a little fennel water or caraway seed water, with sugar and plain water, may be given; or a carminative composed of rhubarb, magnesia, syrup, and aniseed or caraway seed water. Beyond these, the nurse should be allowed the command of no medicine whatever, unless ordered by the medical attendant; nay more, she should be absolutely prohibited from having any in her possession, for it is not unusual for her to provide herself with a little Godfrey's cordial, syrup of poppies, or even laudanum, and administer it for the purpose of quieting the child, and avoiding the trouble of rising in the night. Dr. Dewees remarks: "Nurses generally make a point to have a certain period of the day at their command; and should they find this hour repeatedly interfered with by the wakefulness of the child, they will soon have recourse to such means as shall prevent its future recurrence. We have known a number of cases where landanum was administered for this purpose, with so much cunning as to elude detection for a long time, even after the suspicion had been excited. In one of these instances, the wily nurse boasted to the abused parent of her good management in establishing so much regularity in the child's sleeping."*

THE NURSERY AND NURSES.

So much of the health and comfort of children depends upon the nursery and their attendants, that I cannot omit a few words upon each. As the infant will spend a considerable portion of its time for

* On Diseases of Children.

the few first years in the nursery, its situation and suitability cannot be a matter of indifference. Plenty of fresh, pure air and light is the first requisite, but this will of course depend upon the situation of the house. In the country it is easily obtained, but in towns other circumstances determine in a great measure the choice of a house. The choice of a room for the nursery, however, is in our power, and any sacrifice should be made to secure one which may promote the health of those who are so dear to us. It should be large, airy, light, well ventilated, and easily warmed. Generally speaking, the upper room in the house is the best ; it has freer access of air, and more light and greater cheerfulness.

It should be neatly papered and painted, and so arranged that perfect order may be preserved. Just so much furniture should be allowed as is necessary, and no more, as the more space without obstruction, for the child to play about, the better. The beds should be so placed as to be easy of access, and they should be provided with partial curtains, just enough to shade the eyes from the light. I think the light iron bedsteads, with heads and castors, by far the best, for many reasons. It is better not to have a carpet, or at most a very small one, as it accumulates dust, and is an obstacle to a young child in its early efforts to walk. The floor should be scoured once a week, or oftener if necessary, and the most minute cleanliness and order observed about everything used in the nursery.

After dressing in the morning, it is very desirable that the children should all leave the nursery for an hour, during which time the windows and door should be opened, so as to secure perfect ventilation after the night, and a fresh, wholesome room on their return, and this should be repeated occasionally during the day, when they are absent.

The temperature must be regulated according to the season and the aspect of the house ; it should range somewhere between 60° and 70°. During winter, and a portion of spring and autumn, a fire will be necessary during the day, but not during the night, unless in case of sickness, and care should be taken that the nurse, for her own enjoyment, does not make it too large. During summer, if the room be exposed to the sun, it will become warm enough, but if there be any doubt, it is better to have a little fire, as warmth is essential to the comfort and health of children.

“From pure ignorance on the part of the parents, it is also a common practice not only to crowd several children and one or two nursery maids into a small room, but to allow cooking, washing, and other household operations connected with the nursery, to be carried on in it. Nothing, however, can be more injudicious, or more directly at variance with the duty of parents to promote to the utmost the welfare of their offspring.” “If the size of the house will admit of it, the day nursery should always be separate from the sleeping one. Wherever one or two persons sleep, the air is always considerably contaminated before morning, and the impurity is of course so much the greater where, as

is often the case, several children sleep in the same apartment. If there be only one bed-room, it is impossible to remove the impurity by adequate ventilation, because even in summer the draught from the open windows is attended with risk, and during at least two-thirds of the year in this country the cold and damp of our climate would render it utterly impracticable to keep them open for a sufficient length of time. But the case is altogether different when there is a day room in addition. The children can then be removed from the vitiated air and impurity of their sleeping apartment into a wholesome and bracing atmosphere, and the bed-room be thoroughly cleaned, the bed-clothes and everything else well aired, and the room itself effectually ventilated, without risk to any one.* There can be no doubt of the advantage of this plan, but it is not often practicable in towns, where the family is large; and in such cases, if the children be allowed to descend to the parlour in the morning, after being washed and dressed, the nursery may be very well ventilated in half an hour.

I would repeat that cleanliness and order ought to be rigorously enforced in the nursery, not merely for the sake of health, but as a part of the practical education of the children.

NURSES.

Considering how many hours, days, and weeks children spend alone with their nursery attendants, and also the extreme impressibility of early life, it is certainly surprising that more care is not bestowed on the selection of a nurse and nursery maids than we usually find. First impressions are the strongest, and especially when those are evil; and I have no doubt that much of the trouble that parents experience in the moral government of children might be traced to the lessons, practical and verbal, that they have received in the nursery. Habits of irregularity, disorder, equivocation, and self-indulgence, are daily taught them by example; and if they be discouraged by precept, we know that the former lessons are far more permanent. Evil words and selfish actions leave an impression long after their source is forgotten. I have often heard parents express their astonishment at vulgar habits and low expressions from their children, who never thought that they were indebted for their acquisition to themselves, through the nurses they had chosen. The nurse who has the charge of the children, or the principal nurse, if there be more than one, should be a woman of middle age, if possible, one who has been a mother herself, and somewhat above the station of a servant, so as to secure better education and better manners. She ought to be upright, kind, and religious, for she who has not reverence towards God is utterly unfit to mould the character, or govern the habits of young children. Her temper should

* Combe, p. 61.

be mild, cheerful, and forbearing, for the management of children may tax her good nature severely, and yet if she give way to irritation she may injure the child's temper irretrievably; and cheerfulness is so much the character of childhood, and so necessary for mental and moral health, that a nurse would be essentially deficient in whom it was absent.

A love of truth and an abhorrence of lying in any form, whether in the shape of excuses, deceit, concealment, or falsehood, is essential, unless we wish the ruin of children, for they will learn from the actions of the nurse rather than from her precepts, and the instruction of a wise mother will be entirely thrown away, if counteracted by the conduct of the nurse. It will also be a great advantage if she be able to read and write. I need not dwell upon the necessity of habits of order, cleanliness, and personal tidiness; these are hardly likely to be overlooked by a careful mother, although she may not appreciate their influence upon the habits and character of her child.

P A R T II.

THE DISEASES OF INFANCY AND CHILDHOOD.

THE plan I propose, in each section of the present division of the work, is, first, to notice the diseases by which the fœtus is most frequently attacked during the intra-uterine life; then to treat of those which it presents to us at birth, whether of long standing or acquired during childbirth, together with certain malformations which require treatment; and lastly, to enter at length into the consideration of the diseases which affect infancy and childhood. These I propose arranging neither according to the period of life at which they occur, nor according to their pathological characteristics, but simply according to the systems affected, so far as this can be done; thus grouping together diseases of the nervous, respiratory, digestive systems, &c. &c. Whatever may be lost, in a scientific point of view, by this arrangement, will, I trust, be more than compensated by the practical advantages of exhibiting the morbid conditions of organs in their systematic relations. Afterwards, I shall treat of fevers, and other affections which do not admit of much classification.

SECTION I.

DISEASES OF THE CEREBRO-SPINAL SYSTEM.

CHAPTER I.

INTRA-UTERINE OR CONGENITAL DISEASES.

CONVULSIONS.

MANY authors have maintained that the fœtus *in utero* is subject to epileptic or convulsive attacks. Duettel states: "Nullus autem affectus familiaria solet esse proli in utero quam epilepsia." And Segerus relates a case of a pregnant woman who suffered severely from this disease, and in whom the fœtus exhibited similar convulsive movements. Lowenheim held that it was not uncommon, and Hoogveen and Feiler relate examples. Hufeland thinks that these convulsive movements are dependent upon, or derived from, the mother.*

There are few practitioners of any standing who have not been consulted on account of the distress caused by the violent movements of the fœtus; in many cases the annoyance arises from excess of uterine sensibility, but in others the movements appear to be excessive, irregular, and of temporary duration, subsiding after a time, to return in moderate degree, or to recur again in paroxysms, or perhaps to cease altogether. Such cases I have several times observed, and in the latter instances the child has been stillborn, and the period of its death referred to the close of the violent convulsive movements. In a case of this kind, where the death of the child corresponded to the mother's perception of the convulsive movements, Dr. McSweeney found, on dissection, that the membranes of the brain were greatly injected. Whether these are cases of epilepsy may of course admit of a question, but it is of little consequence, as during intra-uterine life nothing remedial can be attempted.

* Graetzer Die Krankheiten des Fœtus, p. 259.

HYDROCEPHALUS.

The occurrence of hydrocephalus in the fœtus is not a discovery of modern times. Thus Blancard relates a case of a fœtus of seven months, where a large quantity of water was found between the dura and pia mater;* and Rusæus another, where the head was so distended with fluid that it weighed more than the rest of the body.† Lecheliuss, Schurig, and Hooegeveen give similar cases. In more modern times the disease has been described by Voigtel, Meckel, Otto, Alibert, Rudolphi, and as an impediment to delivery, by almost all midwifery authors. It is not very uncommon among the lower classes; I have seen at least five or six cases.

Some writers have attributed it to an arrest of development, but Rudolphi considers it‡ to be a special disease, arising from excessive congestion of the membranes, or from inflammation. Another view of the origin of this disease, which has been put forward by Breschet and Behrend, is, that it consists in an excess of the fluid which exists naturally in the cavities of the brain, as was noticed by Cotunniius, Morgagni, Magendie, &c., and called by the latter the cerebro-rachidian fluid. This fluid may either be confined within limits, or by its pressure may produce encephalocele, hydrencephalocele, or spina bifida. I shall have to notice this view again when speaking of chronic hydrocephalus, and therefore shall only state that I think it offers a reasonable explanation of a portion of these cases. During foetal life, of course, we can obtain no evidence of its existence. In many cases the fœtus is dead before birth; in others, when the fluid is considerable, it has to be destroyed even if alive, in order that labor may be completed; and in very few cases is the child born alive. Should the disease not have proved fatal, and the enlargement of the head be so moderate as to permit of its transit through the pelvis without an operation, then the treatment will be that of chronic hydrocephalus, of which I shall speak hereafter.

ABSENCE OF BRAIN OR SKULL.

Examples of an arrest of development in the brain or cranial vault may be seen in every museum, and many plates of such cases are given by Geoffroy St. Hilaire in his learned work on monsters, and by other authors who have entered fully into the many interesting questions

* Collect. Phys. Med., Cent. i. Obs. 75, fol. 65.

† De Extract. Fœtus, cap. 23, 1562.

‡ Abhandl. der Königl. Acad. zu Berlin, 1824, p. 121.

depending thereupon, and to whom I must refer my readers.* It is enough for my purpose to state, that the brain or skull are more or less defective in such cases. I have one preparation in which the brain presents the appearance of a bunch of tumors; another where a portion only of the brain exists; and a third where it is entirely wanting; and in all the cranial vault is absent, the base of the skull alone remaining.

That these are cases of arrest of development, and not the result of disease, can admit of no question; and that they afford a wide field of physiological investigation, which has been but partially explored, is equally true. This malformation does not necessarily prohibit the full growth and development of the foetus, nor its being born alive and apparently healthy, but it seldom lives more than a day or two. In one case which occurred at the Western Lying-in Hospital, the child was large and healthy, but it had neither brain nor skull, except the base, and it had cleft palate and double hare-lip. It lived two days. Formerly it was considered right to destroy such monsters; under the wiser legislation of modern times it is considered to be criminal, and punished accordingly.

HERNIA CEREBRI.—ENCEPHALOCELE.

This malformation is also due to an arrest of development in the ossification of the cranium, by which the fontanelles and sutures are left incomplete, or to the pressures of the cerebro-rachidian fluid in consequence of which the bones are separated or perhaps absorbed. It has been called *podencephalie* by Geoffroy St. Hilaire, when the deficiency is at the upper part of the cranium, and *notencephalie*, when the arrest takes place posteriorly. Through the space thus left the brain protrudes, forming a tumor above or behind the head, covered in the majority of cases by the integuments. The tumor is soft, rounded, and pulsating in accordance with the pulse, yielding to pressure and disappearing, without discoloration of the integuments, and circumscribed at its base by the defective bone. The size will vary according to the amount of brain which escapes through the opening; those which are situated superiorly at the anterior fontanelle appear to be the smaller. Sanson mentions a case in which the entire brain escaped by a round opening corresponding to the posterior fontanelle; the infant lived fifteen hours, and its functions were all naturally fulfilled.†

If the sutures be very defective, the cerebellum may protrude. In 1813 two such cases occurred at Paris. In one, Professor Lallement mistook the disease for a common tumor, and commenced an

* See the article Anencephalie in Dict. de Méd. et de Chir. Prat., vol. ii., p. 377.

† Art. Hernie, Dict. de Méd. et de Chir. Prat., vol. ii., p. 496.

operation for its removal, when, after making some of the necessary incisions, his proceedings were stopped by his seeing the white silvery color of the dura mater, and that the swelling came out of an aperture in the occipital bone. The day after the operation the child was seized with violent pain in the head, had a hard pulse, prostration of strength, vomiting, &c., and died in the course of the week. On dissection, a part of the tentorium and an elongation of the two lobes of the cerebellum about as large as a nut, were found in the protruded sac of the dura mater. Several abscesses were also discovered in the substance of the cerebellum. "The other example fell under the observation of M. Baffos; upon the death of the child the dissection evinced similar appearances."*

A more remarkable instance of cerebral hernia is mentioned by M. Sanson as having been observed by M. Serres, in which the brain protruded through a fissure in the base of the skull, and projected into the pharynx.

But though in the greater number of cases the skull alone is deficient, the integuments covering the tumor are perfect, yet in some cases there is a deficiency more or less of the integuments of the head. This occurs most frequently about the posterior fontanelle, and then the brain hangs like a bag at the back of the neck. The children are generally stillborn. Richerand mentions that several such examples are preserved in the museum of the Faculty of Medicine at Paris.†

A curious case of more extensive deficiency, both of bones and integuments, was published in 1810 by Dr. Burrows: "The whole of the forehead, summit, and a large part of the occiput, were deficient, and instead of them a substance projected of a light mulberry color, and of the mushroom form, except that it was proportionably broader. From the deficiency of bone the eyes appeared to project much more than usual."‡ On dissection, the scalp, os frontis, the parietal, and a great part of the occipital bones, were wanting. Through the parts at which these bones were deficient the cerebrum projected, exhibiting its usual convolutions. It was covered with the pia mater, was of a mulberry color, appeared to be more vascular than the pia mater usually is, and the edge of the scalp adhered to the neck of the tumor. The cerebellum was not more than one-fourth of its usual size, for the posterior part of the os occipitis was much nearer to the cella turcica than natural. The child was destitute of the power of voluntary motion, and all the secretions appeared to be stopped. This case resembles a good deal the one I have already mentioned, in which the vault

* Cooper's Surgical Dictionary, Art. Hernia Cerebri, p. 754.

† Nosographie Chirurg., vol. ii., p. 316.

‡ Med. Chir. Trans., vol. ii., p. 52.

of the cranium was absent, and the brain and cerebellum, inclosed in (apparently) the dura mater, was divided into several round tumors, the size of small potatoes. These cases, however, strictly speaking, scarcely come under the definition of hernia.

Diagnosis.—The only diseases with which congenital encephalocele might be confounded are cephalæmatomata of the scalp and accidental tumors; but a little care will generally be sufficient to enable us to distinguish them. Hernia cerebri is almost always in the line of the sutures, where a space is left from the arrest of bony growth; cephalæmatomata, on the contrary, are very seldom indeed, and then only partially, situated over the sutures or fontanelles; formed by pressure of the os uteri, and increased by the pressure of the os externum, they will always be found on the exact part which presented, and in no case is any suture more than slightly involved in the presentation. Moreover, in hernia, the absence of bone beneath the tumor can be ascertained; and in cephalæmatomata, although the circular ridge gives at first a feeling of there being a perforation, yet on pressing the swelling on one side, the unbroken surface of bone may be felt. Lastly, there is a constant pulsation, synchronous with the pulse, in hernia, and the tumor can be depressed to the level of the skull; but in cephalæmatomata there is no pulsation, or an uncertain one communicated from the fontanelle, and the tumor does not disappear under pressure.

The situation of the tumor, the absence of cranium underneath, the marked pulsations, and its disappearance under pressure, will distinguish hernia from any other kind of tumor which is formed upon the scalp.

Treatment.—All writers, I believe, are agreed that the best mode of treatment consists in the application of gentle and equable pressure. M. Salleneuve used a piece of thin sheet lead, softly padded, and fastened to the child's cap at the part corresponding to the tumor, and the pressure was increased or diminished by tightening or loosening the cap. By thus depressing the tumor gradually, and without injury, an opportunity is given for the growth of the bone, and the completion of the defective space, which of course is the radical cure of the hernia. M. Salleneuve related to the Royal Academy of Surgery of France, a case which was thus cured.* Callisen and Sanson concur in the propriety and feasibility of this mode of treatment, when the tumor is small; but when it is large, and at the occiput especially, little more can be done than some contrivance to protect it from injury.

When the tumor consists mainly of fluid it may be worth while trying the effects of puncture, with or without compression. Mr. Lyons

* Mém. de l'Acad. de Chir., vol. viii., p. 103.

punctured the tumor on the right side of the nose, and afterwards on the left side, but the child died. Mr. Adams punctured a tumor seven times with success, ultimately leaving a solid tumor, which was apparently a protruding portion of the brain. Mr. Earle repeated the operation nine times, and the child lived two months. And Mr. Dendy operated three times in nine days, allowing nearly twelve ounces of fluid to escape, but the child died on the tenth day. These instances, however, are not very encouraging.

SPINA BIFIDA.—HYDRORACHITIS.

In some respects this congenital disease bears a strong analogy to the one last described, depending either upon an arrest of development in some portion of the spinal canal, or upon an excess of the cerebro-rachidian fluid, which by its pressure first produces absorption of the bones, and then protrudes the membranes by which it is surrounded in the form of a soft tumor, varying in size from a walnut to a foetal head. The most frequent situation of this malformation is in the lower lumbar vertebræ, next in the dorsal region, and occasionally in both at once, next in the bones of the sacrum,* then in the cervical region, and lastly in the lower portion of the sacrum, as in the case published by M. Vrolik.

The disease consists in a deficiency of the spines and bodies of the vertebral canal, and the different degrees have been grouped into three classes by Fleischmann and others.†

1. When the entire vertebra is divided: this case is extremely rare. Ollivier recites three cases related by Tulpius, Malacarne, and Zuringer, in which it existed.

2. An absence of a greater or less portion of the lateral arches of the canal: this is the most common variety. And

3. Where the arches are well developed, but without union posteriorly: here, however, the separation can be but a few lines, resembling a groove rather than an aperture. Ruysch, Acrell, and Isenflamm‡ have each described a case of this kind; the former in the lumbar region, the second in the sacrum, and the latter in the first cervical vertebra.

In each class the limit of the deficiency is marked by the edge of the bone, sometimes smooth and level, sometimes irregular, and sometimes with the edges turned a little outwards. Ordinarily the spines of the vertebra share in the malformation, and are divided or altogether absent. It must be remembered, however, that the absence of the

* Ollivier, *Mal. de la Moëlle Epiniere*, vol. i., p. 184.

† *Vitiis congenitis circa Thoracem et Abdomen*. Erlangen.

‡ *Arch. Gén de Méd.*, vol. iv. p. 299.

spinous processes is no proof of spina bifida. Beclard has found them absent several times as a simple malformation, the bodies preserving their integrity.

The tumor, varying in size, and of a round or oblong shape, or occasionally, as in Mr. Brewerton's case,* consisting of two cysts, is generally covered by the skin, which, when it is very small, may be of the natural color, but which, as the tumor increases, becomes thin, transparent, and generally marbled with reddish or violet shades. In some cases it appears worn through, and the outer envelope has none of the characters of the skin, but resembles a very fine vascular membrane, which is indeed the dura mater of the cord, beneath which we find the arachnoid and the pia mater. Occasionally, though rarely, the dura mater is defective, and the arachnoid becomes the external covering.

The fluid contained in the tumor is generally limpid serum, resembling that secreted in hydrocephalus, and containing, according to the analysis of Bostock, Marcet, and Lassaigne, water, albumen, ozmazome, mucus, and salts of potash or soda, in small quantities. It is occasionally turbid or tinged with blood. The quantity varies: Siebold saw more than a pint escape, Vogel two pints, and Mr. Innes about seven pints.

The condition of the spinal marrow is of considerable interest. Ollivier states that, when the case is not complicated with hydrocephalus, he has generally found the spinal marrow traversing the sac unaltered, except that in some cases it seems lengthened. But if co-existent with hydrocephalus, or if the canal of the spinal marrow be distended with fluid, the cord may be flattened out, as it were, so as apparently to line the sac.† Or, either from the extreme distension or from some morbid process, the cord may be partially or wholly destroyed, leaving at most some shreds or filaments. Ruysch and Greeve observed the remains of the cord thin and softened, covered with watery vesicles, and Acrell discovered it covered with hydatids. In some few cases the spinal cord seems to have left the canal, and to be contained within the tumor, forming what some authors have properly called hernia of the spinal marrow. This happens only when the deficiency is at the lower end of the spine.

To the touch the tumor feels soft and fluctuating, and by a little care we may detect the deficiency in the spinal canal, at the base, or a little underneath the base of the tumor. Pressure upon the tumor causes uneasiness, convulsions, or coma.

The effect of this malformation upon the portion of the body supplied with nerves by the lower part of the spinal marrow varies in degree, depending, most likely, on the degree of pressure, from within or with-

* Edin. Med. and Surg. Journ., vol. xvii.

† Dugès, Dict. de Méd. et de Chir. Prat., vol. x., p. 138, Art. Hydro-rachis.

out, upon the cord. In almost every case the child has less power than usual in its legs ; however, Mr. Cooper has related a remarkable exception in a child who had one of the largest spina bifidas he ever beheld, and which was unattended with any such weakness ; “ indeed, the child was, to all appearance, as stout, healthy, and full of play as possible. The fatal event, however, took place after a time, as usual ; and a little before death a remarkable subsidence of the swelling occurred, which, however, never burst externally.”

I have seen more than one case in which the infant retained the power of voluntary motion, but none that could walk. In other cases, the limbs are atrophied and completely paralyzed ; and in the worst instances, the bladder and rectum are equally affected, and the child can neither control the urine nor fæces.

The tumor may burst before birth with or without the destruction of the child. Generally, however, we find it unbroken, but in a few days or weeks the surface becomes inflamed, small patches of superficial ulceration appear to coalesce, until a large and deepening ulcer is formed, which soon perforates the sac, evacuates the fluid, and, by exposure of the spinal marrow, occasions inflammation, convulsions, and death very shortly : or the opening may be small and fistulous, with the like results. The age at which this termination occurs varies, although it seldom exceeds three years. However, Bonn relates a case that lived to the age of ten years ; Warner one aged twenty ; Camper one aged twenty-eight years ; and Swagermann mentions an individual thus affected who lived fifty years.* Mr. Samuel Cooper relates that he saw, under the care of Mr. C. Hutchinson, a young woman, nineteen years of age, who had a spina bifida, which was of astonishing size, and situated at the lower part of the vertical column. One curious circumstance in the case was that the patient used to menstruate through a sore in the thigh. I conclude that this is the same case as is described by Mr. Innes, and who states the measurement of the swelling to have been thirty inches in its vertical line. The urine and fæces used to pass involuntarily.

With the exception of the paralysis, so long as the child lives the bodily functions continue but little disturbed. I have found the infant to take its food eagerly and to sleep well until the bursting of the tumor.

But in many cases the malformation is not limited to a portion of the spine ; the bones of the skull may exhibit a similar deformity ; the bladder may be extroverted, or the child may have congenital hydrocephalus ; the fluid in the lateral and third ventricles passing into the fourth, through the aqueduct of Sylvius, and rupturing the calamus scriptorius, escapes into the vertebral canal. In these cases the volume of the head has been observed to diminish after the rupture of the spina bifida.

* Ontleed Heelkund, Verhandl. Amst., 1767.

From the details already given it is evident that, though not in every case fatal, yet that the *prognosis* is in all cases unfavorable: so few cases escape that we can indulge but little hope of any one in particular. In addition to the case of recovery already mentioned, I may add that Morgagni,* Kielmann,† and Jervis,‡ each relate one, and Sir A. Cooper two, in which the patients have lived. These are, I believe, all, or nearly all, on record; and, without diminishing the serious character of the disease, they just afford a reasonable ground for attempting some kind of treatment.

The symptoms which mark the approach of death are nearly alike in all cases. When the opening is small and fistulous, the fluid changes its character and becomes turbid, then more or less purulent, and perhaps fœtid, after which convulsions set in. When the opening is larger, inflammation occurs more rapidly, and the convulsions follow speedily. The termination is rapid, in proportion as the inflammation extends up the vertebral canal.

Treatment.—Various methods of treatment have been proposed and tried, but with very little success, as we have seen. Mr. Abernethy recommended a slight degree of pressure on the tumor from the commencement, with the double object of limiting the distension of the dura mater, and promoting the absorption of the fluid. Should the fluid increase, notwithstanding, he proposed to evacuate it by a fine instrument, to anticipate its bursting. The wound is then to be closed and allowed to heal, and the pressure to be resumed. He tried this plan in one case, where ulceration had commenced; the punctures were repeated every fourth day for six weeks; the wounds healed very well, until at last one of them became ulcerated; the discharge became purulent, and the child died. Heister mentions a case of compression under the care of a surgeon named Steuber.

Sir Astley Cooper relates a case of preservation of life, though not of radical cure, by compression, which I shall extract. "James Applebee was born on the 19th of May, 1807, and his mother immediately after his birth, observed a round and transparent tumor in the loins, of the *size of a large walnut*. On the 22nd of June, 1807, the child was brought to my house, and I found that although it had spina bifida, the head was not unusually large, and the motions of its legs were perfect, and its stools and urine were discharged naturally. I applied a roller round the child's waist, so as to compress the tumor, being induced to do so from considering it a species of hernia, and that the deficiency of the spine might be compensated for by external pressure. The pressure made by the roller had no

* De Sedibus et Causis Morb. Epist. xii., Art. 9.

† Prodrom. Act. Havn, p. 137.

‡ Journal Gén. de Méd. 1106, vol. xxvii., p. 162.

unpleasant influence on its voluntary powers ; its stools and urine continued to be properly discharged ; but the mother thought that the child was occasionally convulsed. At the end of a week a piece of plaster of Paris, somewhat hollowed, and that hollow filled with a piece of torn lint, was placed upon the surface of the tumor, a strap of adhesive plaster was applied to prevent its changing its situation, and a roller was carried around the waist to bind the plaster of Paris firmly on the back, and to compress the tumor as much as the child could bear. This treatment was continued until the month of October, during which time the tumor was examined about three times a week, and the mother reported that the child was occasionally convulsed. When the child was five months old, a truss was applied, similar in form to that which I sometimes use for umbilical hernia in children, and this has been continued ever since. At the age of fifteen months it began to make use of its limbs ; it could crawl along a passage, and up two pair of stairs. At eighteen months, by some accident, the truss slipped from the tumor, which had become of the size of a small orange, and the mother observed, when it was reduced, that the child appeared in some degree dull ; and this was always the case if the truss was left off for a few minutes, and then re-applied. At fifteen months he began to talk, and at two years of age he could walk alone. He now goes to school, runs, jumps, and plays about just like other children. His powers of mind do not appear to differ from those of other children. His memory is retentive, and he learns with facility. He had the measles and the small-pox in the first year, and whooping-cough at three years. His head, previously and subsequently to the bones closing, has preserved a due proportion to other parts of the body. The tumor is kept by the truss entirely within the channel of the spine ; but when the truss is removed, it soon becomes of the size of half a small orange. It is, therefore, necessary that the use of the truss should be continued. When the truss is removed, the finger can be readily passed through the tumor into the channel of the spine."*

For success in this operation it is requisite that the tumor be small, the skin unbroken, and the disease local and uncomplicated.

Richter has proposed the insertion of two caustic issues at a little distance from the tumor, but it does not appear that his suggestion has been adopted.

Forestus, in the first instance, and Mr. B. Bell, more recently, advised the application of a ligature round the base of the tumor, provided the disease be local, and a mere distension by fluid in consequence of the imperfection of the bones, and not a disease of the spinal marrow, or membranes, and it be not complicated. It does not appear that either of them tried it, but it failed with a case of Heister's.

* Med. Chir. Trans., vol. ii., p. 323.

Dessault* and Mathey† proposed the insertion of a seton through the tumor, but this would be to increase the ordinary chances of meningitis by admitting the air. Portal saw an infant die three days after the insertion.

Some time after the beneficial employment of compression already mentioned, Sir Astley Cooper attempted, and with perfect success, to cure the disease radically, by evacuating the fluid, and then applying pressure. The case was as follows: "Jan. 21, 1809.—Mrs. Little, of Limehouse, brought to my house her son, aged ten weeks, who was the subject of spina bifida. The tumor was situated on the loins; it was soft, elastic, and transparent; and its size about as large as a billiard-ball when cut in half; his legs were perfectly sensible, and his urine and fæces were under the power of the will, &c. Having endeavoured to push the water contained in the tumor into the channel of the spine, and finding that if the whole were returned the pressure would be too great for the brain, I thought it a fair opportunity of trying what would be the effect of evacuating the swelling by means of a very fine-pointed instrument, and by subsequent pressure to bring it into the state of the spina bifida in Applebee's child. I therefore immediately punctured the tumor with a needle, and drew off about two ounces of water. On the 25th of January, finding the tumor as large as before it had been punctured, I opened it again, and in the same manner, and discharged about four ounces of fluid. The child cried when the fluid was evacuated, but not whilst it was passing off. On January 28, the tumor was as large as at first. I opened it again, and discharged the fluid. A roller was applied over the tumor and around the abdomen. Feb. 1, it was again pricked, and two ounces of fluid discharged. On the 9th, the same quantity of fluid was evacuated as on the 4th, but instead of its being perfectly clear as at first, it was now sanious, and had been gradually becoming so in the three former operations. On the 13th, the same quantity of fluid was taken away, a flannel*roller was applied over the tumor and around the abdomen; a piece of pasteboard was placed upon the flannel roller over the tumor, and another roller over the pasteboard to confine it. On the 17th, three ounces of fluid, of a more limpid kind, were discharged; the pasteboard was again applied. On the 27th, the surface of the tumor inflamed; the fluid, not more than half of its former quantity, was mixed with coagulable lymph, and the child, suffering considerable constitutional irritation, was ordered calomel and scammony, and the rollers were discontinued. On the 26th, the tumor was not more than a quarter of its former size; it felt solid, the integuments were thickened, and it had all the appear-

* *Traité de Mal. Chirurg.*, 1779, vol. ii.

† *Séance pub. de la Soc. Roy. de Paris*, Dec. 9, 1779, p. 32.

ance of having undergone the adhesive inflammation. On the 28th, it was still more reduced in size, and felt solid. March 8th, the swelling was very much lessened, the skin over it thickened and wrinkled; a roller was again had recourse to; a eard was put over the tumor, and a second roller applied. March 11, the tumor was much reduced; the skin covering it was a little ulcerated. On the 15th it was flat, but still a little ulcerated. On the 27th, the effused coagulable lymph was considerably reduced in quantity, and of a very firm consistence. On the 2nd of May nothing more than a loose pendulous bag of skin remained, and the child appearing to be perfectly well, the bandage was soon left off."* No further inconvenience was felt by the child, and Mr. S. Cooper had an opportunity of examining both this case and the previous one (Applebee) in January, 1838, Mr. Little being then twenty-eight years old, and Mr. Applebee twenty-nine. Both were active and in perfect health.

The operation by puncture has been several times performed since. Dr. Sherwood tried it and failed.† Otto punctured a tumor in a child also affected with hydrocephalus, and the tumor disappeared, but the child died three weeks afterwards.§ Pliny-Hayes lost a patient in two days after a single puncture.|| In 1819, Dr. Berndt failed in three cases; the first died twelve days after the operation, the second after three weeks, and the third after three punctures. Benedict Trompei performed the operation upon a girl of six years old, with a cataract needle, and she died comatose thirteen days after. I tried the same plan three or four years ago, and the tumor was becoming more solid, so that I began to have some hope of success, when the child was seized with convulsions and died. I have also tried puncture with direct and lateral compression without success.

Still, small as the chance is, it would appear that, of all the methods proposed, the most feasible is compression alone or combined with acupuncture. MM. Robert, Rosetti, and Ruggretin have successfully used puncture with compression. In the *New York Journal of Medicine* for September, 1843, a case is related by Dr. Stevens, of New York, successfully treated by puncture alone. The tumor was about three inches and a half broad from side to side, and it was punctured three different times, and more than nine ounces of fluid escaped. After the last operation the sac inflamed, and the child became irritable and restless; but these symptoms soon subsided, and a year after nothing remained of the sac but a small bunch of indurated and corrugated integument. The child was eight months old. Dr. Nevins

* *Med. Chir. Trans.*, vol. ii., p. 326.

† *Med. Repository*, 1812, vol. i.

‡ *Ollivier, Mal. de la Moëlle Epiniere*, vol. i., p. 226.

§ *Braithwaite's Retrospect*, vol. ix., p. 240.

mentioned at the Liverpool Pathological Society, three cases in which puncture had been tried. One case was cured, the gentleman being now 40 years of age; the second died, and the third was quite well at the end of three or four months with the sac contracted.* Dr. Hana, of Illinois, has related a case in which spontaneous rupture of the sac took place after measles, and the child recovered.†

Puncture, followed by injection with iodine, has been tried, and though many cases have died, Mr. Brainerd published in 1847 a successful case of his own, and refers to two others. He used a solution of iodine and hydrodate of potash in distilled water, allowing it to remain a little time in the sac.‡ M. Chassaignac has also recorded a successful case.§

CHAPTER II.

CEPHALÆMATOMA—FRACTURES OF THE CRANIUM, &c.

THE tumors which are observable on the head of the infant at birth although congenital, are not of intra-uterine growth, being entirely mechanical in their origin, and produced during the passage of the child into the world. After the liquor amnii has been discharged, the head of the child comes into immediate contact with the cervix uteri, occupying or closing the partially dilated os uteri, the edges of which, according to the resistance they offer, press more or less firmly upon the scalp. If this circular pressure be considerable, it necessarily interrupts the cutaneous circulation, and after a time the portion of scalp thus inclosed is observed to swell, and become more or less tense; and if the head of the child be examined after its birth, a tumor of varying size and density will be discovered at this part. This is what has been called the *caput succedaneum*. The size of the tumor is in proportion to the delay and pressure at the orifices through which the head has passed, and its situation indicates accurately the part which presented; the primary tumor being formed by the os uteri, and a

* Lond. Medical Gazette, Jan. 1850.

† Amer. Med. Journal, Oct., 1850, p. 551.

‡ Bouchut, *Traité pratique des Maladies des Nouveaux nés*, 2nd edit., p. 166.

§ Gazette Medicale, 1857.

secondary or supplementary one by the vaginal orifice, if there be much resistance or delay there. If the part presenting there, be the same as at the os uteri, the tumor will merely be enlarged; but if the position of the head be altered, it will be extended in one direction or the other, according to the part embraced by the external orifice. As the situation of these swellings is sometimes of importance to their right diagnosis, I shall shortly state where we find them in the different positions of the head. In the *first position*, the head lies across the brim of the pelvis in its left oblique diameter, with the posterior fontanelle towards the left acetabulum; the os uteri embraces part of the right tuber parietale and the bone superior to it up to the suture, and in this situation we find the primary tumor, which, by the pressure of the lower outlet, is generally extended posteriorly, whilst it embraces more of the tuber parietale. In the *second position*, the tumor is formed in the same situation, but upon the left parietal bone, *i. e.*, on the superior, and rather posterior part, including more or less of tuberosity. In the *third position*, I have found the primary tumor more anterior or nearer to the anterior angle of the left parietal bone, than the posterior, but owing to the change from the third to the second position, which the head makes in its transit through the cavity, the secondary tumor is extended posteriorly over the greater part of the tuber and the superior and posterior part of the parietal bone. So in the *fourth position*, the primary tumor is formed anterior to the tuber, but at the lower outlet extended posteriorly.

In the *first position of face presentations*, viz: with the forehead towards the *left* ilium, "there forms," says Naegelè,* "a swelling, first upon the upper part of the right half of the face, which in this species of face presentation is always situated lowest." "But if the third stage advance slowly, and the inferior half of the right side of the face, viz: part of the right cheek, will be remarked after birth as being the principal seat of the swelling." In the *second position of the face*—the forehead towards the *right* ilium—the left side of the face is the seat of the tumor, or of the red mark which indicates it; the upper part of the primary, the lower of the secondary tumor. I should mention that the situation of the tumor in face presentations is indicated rather by a red-colored mark (the result of pressure) than by a defined swelling.

We may now turn to the examination of these tumors themselves, their nature, pathology, and treatment, and it will be seen that they are by no means so simple or so uniform as might be supposed. The simpler ones are by far the most frequent, in fact it is seldom that we meet with the cephalæmatomata, as they are called: I have myself for some time past taken every opportunity of examining these tumors,

* Mechanism of Parturition, Trans., pp. 77, 78.

and such information as I have been able to obtain I shall incorporate with that given by the authors whose works I have consulted.

1. The simplest and most common tumor, when laid open, will be found to consist of yellowish serum, effused under the scalp, and very rarely also beneath the pericranium. The scalp preserves its usual density, and the bone and pericranium are in a state of perfect integrity. The tumor is formed during the passage of the head of the child, and does not increase after birth. It is limited simply by the pressure of the os uteri and os externum. For this kind of tumor no treatment is necessary, as very shortly after birth it loses its peculiar form, and after twenty-four hours often entirely disappears. If not, a spirit lotion, occasionally applied, will hasten its dispersion.

2. Occasionally, instead of simple serum, the tumor consists of sero-sanguineous fluid, owing, probably, to the greater amount of pressure, or the fragility of the bloodvessels, or to both. In such cases we find the scalp unusually vascular, with small ecchymoses on its surfaces, especially the inner. In some cases I have also observed small ecchymoses upon the pericranium, and the surface of the skull, but the bone is perfectly sound. Most of these cases also subside without special treatment, or after the application of a spirit lotion; but in some rare examples I have known inflammation to attack the tumor, followed by ulceration or abscess. This will be the more likely if violence of any kind have been used. If we find inflammation arising, and the spirit lotion ineffectual, the best application is a soft, warm poultice, frequently repeated. The same treatment will be the best in case of ulceration, at least at first, and afterwards some slightly stimulating ointment or lotion. If an abscess form, of course the best plan is to evacuate the pus by a free incision, followed by poultices. Fortunately these cases are very rare.

3. The third variety of tumor is the sanguineous, or cephalæmatoma, as it is called by Naegelè and others. The first writer who distinctly described these tumors was Michaelis;* he was followed by Naegelè,† Zeller,‡ Høere,§ Schwarz,|| Gölis,¶ Osiander,** Chelius,††

* Ueber eine eigene Art von Blutgeschwülsten, &c.—Loder's Journal, vol. ii., cap. 4, 1804.

† Erfahrungen und Abhandlungen, &c., p. 247. 1812.

‡ Thesis, Comment. de Cephalæmate. 1822.

§ De Tumore Cranii rec. nator. sang. 1824.—Siebold's Journal, vol. v.

|| Siebold's Journal, vol. vii., part 2, p. 440.

¶ Pratische Abhandlungen, &c.

** Handbuch der Entbindungskunst, &c.

†† Manuel de Chirurg. (Trans.), vol. ii., p. 186.

Henke,* Rau,† &c., Moscati and Palletta;‡ and from the facts published by these authors, the Memoirs of MM. Pigne§ and Dubois|| were written. M. Halmagrand, in his edition of Maygrier,¶ and Velpeau,** have also added observations of their own to the results previously before the profession. But by far the best essay I know, and one to which I have been largely indebted, is that of M. Valleix, formerly "*interne*" at the Hôpital des Enfants Trouvés, in Paris.††

The simplest and most general of these tumors, which are essentially of the same nature, is, according as the blood is effused immediately under the scalp, under the pericranium, or within the skull. Chelius and Høere describe cases where the effusion takes place in the diploe of the cranial bones.

SUB-APONEUROTIC CEPHALÆMATOMA.

This is the simplest but apparently not the most common form of sanguineous tumor, as in about 500 new-born children, M. Valleix observed it but twice, and neither Naegèlè nor Zeller allude to it. It has been described by Baudelocque,‡‡ Velpeau, Dubois, &c. The blood is effused immediately underneath the cranial integument. In most cases it is probably owing to the violence of the labor, and sometimes to external violence. In general it is promptly dissipated.

SUB-PERICRANIAL CEPHALÆMATOMA.

This appears to be the most common form of the sanguineous tumor, though after all it is rare. M. Naegèlè met seventeen cases in twenty years' practice, and it is the only kind described by him and Zeller. Høere thinks it tolerably frequent. Palletta found but a few cases in a great many children. M. Baron estimates its occurrence at about 1 in 500 children. §§ M. Dubois, during a number of years at La Maternité (where from 2500 to 3000 children are born annually), has seen but six cases. Dr. Doepp, of St. Petersburg, states, that in the

* Kinderkrankheiten, p. 148.

† Handbuch der Kinderkrankheiten, p. 78.

‡ De Abscessu sang. capit. mediol. 1810.

§ Journal Hebdom. Sept. 1838.

|| Nouv. Dict. de Médecine, vol. vii., p. 88.

¶ Page 551.

** Traité des Accouch., p. 513. Ed. de Bruxelles.

†† Mal. des Enfants, p. 495.

‡‡ Art. des Accouch., part i. ch. ii. sect. 11.

§§ Dict. de Méd. Art. Cephalæmatome.

Foundling Hospital it occurred in 262 cases in eleven years, or in one in 190 of the whole number of children in the hospital. M. Velpeau refers to five cases, and M. Valleix* met with four cases in 1937 children in five months at the Hôpital des Enfants Trouvés, or about one in 387.

According to most writers, the tumor is seated about the posterior and superior angle of the right parietal bone, or nearly in the situation of the tumor in the first position; and when small it is placed above, and distinct from the tuber parietale. It is occasionally, but rarely, met with on the left parietal bone, and still more rarely in any other situation. Ordinarily there is but one, but sometimes we may observe one on each parietal bone, separated by the sagittal suture. Naegelè has, however, mentioned a case where a great number were found. Of six cases seen by M. Valleix, three were on the right parietal bone, two on the left, and in one there was a tumor on each bone, but which, he states distinctly, was not the result of the blood passing across the suture. I have seen one remarkable case in which, after a short and easy labor, a tumor formed on each tuber parietale, and on each being punctured, a small quantity of thick dark blood escaped, and then the scalp assumed its natural condition. I am quite at a loss how to explain the production of the double tumor. The second stage was completed in ten minutes, and it was the patient's seventh child.

The size of these tumors varies from that of a small nut to a swelling occupying the whole parietal bone. In the case of double tumor, related by M. Valleix, they were the size of an apricot kernel; in two others they covered seven-eighths of the parietal bone.

There is no proof of these tumors existing before the completion of labor; if we make an examination some hours, or a day, after birth, we find a small tumor, slightly tense, fluctuating, and on pressure from the edge of the tumor inwards we can feel the bone entire. In rare cases the integuments are of a deep red color, and slightly œdematous; and still more rare is it to find a pulsation in the tumor, although Naegelè states that he did so in two or three instances.

But the most striking peculiarity of this variety is a bony circle—"cercle osseux, bourrelet osseux"—which is formed around the effused blood, and limiting it. Palletta has mistaken this for the edge of an opening through the cranium, and to this cause he attributes the formation of the tumors. However, the bone, as Valleix remarks, can be distinctly felt uninjured within this bony ridge, if we pass the finger from the outer edge inwards to the centre.† Michaelis states the bony circle may be felt from the commencement of the tumor; but in this he is not borne out by the researches of Naegelè, Zeller, Høere, and

* Mal. des Enfants, p. 500.

† Valleix, Gaussail.—Presse Méd., 1837, No. 54.

others, who examined with great care. M. Valleix says, that in two cases which he saw only at an early period, he could not detect it: in one it had just commenced, and in a fourth it had not at first attained its full development, but it did afterwards. Wigand relates two cases in which no circle could be felt until twenty-four hours after birth; and M. Fortin,* one in which no circle was present immediately after birth, but which was formed within two days. From these facts we may conclude that it is not present at the commencement of the formation of the tumor, but that it is a subsequent production. It is very perceptible to the touch when found, surrounding the tumor entirely, except when it is over the sutures.

The tumor rapidly acquires its full development, sometimes in a few hours, sometimes in a day or two, and at each time we find it of different sizes in different cases, tense, rounded, defined, elastic, and with fluctuation almost always perceptible. Generally speaking, the color of the skin is unchanged, and it is neither ecchymosed nor œdematous, though there are exceptions. No alteration of the volume is produced by pressure made upon the tumor, nor does it cause stupor, coma, or convulsions; and, according to Valleix, it is quite consistent with the health and thriving condition of the child. Palletta states that the size of the tumor continues to increase until it is opened, but this is not the case: it may increase until the bony circle is formed, but this appears to determine its extent.

Diagnosis.—1. These sanguineous tumors have been mistaken for hernia cerebri, and perhaps this is the affection with which they are most likely to be confounded. MM. Ledran and Corvin made this mistake, as was subsequently pointed out by M. Ferran.† And yet the differential symptoms are sufficiently marked, for in cephalæmatomata there is always fluctuation, which is not present in hernia cerebri; in the latter there is always pulsation, but never in fully-formed cephalæmatomata, and very rarely indeed even at the beginning. In hernia cerebri the perforation in the skull may always be felt, whereas in cephalæmatomata by a little care we can always (with only one or two exceptions on record) feel the cranium beneath the tumor. In hernia, compression gives rise to symptoms of cerebral pressure, but not with cephalæmatomata; and lastly, cephalæmatomata almost never form upon the sutures, whereas this is the most frequent seat of hernia cerebri. In a case related by Fried, hernia cerebri occupied the occiput, and a sanguineous tumor each parietal bone.‡

2. As Dubois observes, there is no danger of confounding cephalæmatomata with hydrocephalus externus, and the osseous circle will dis-

* Mém. de l'Acad. de Chir. vol. v., p. 47.

† Extract. de Thesis de Haller, vol. i., p. 110.

tinguish them from the aqueous cysts mentioned by Zeller. Hœre mentions in his *Memoirs* a case of fungus of the dura mater, but this disease is so rare in infancy (if it ever occur at so early a period) that we run little risk of mistaking the one for the other.

3. Valleix relates a case of abscess of the scalp circumscribed by a thickened condition of the cellular membrane, which had considerable resemblance to the osseous circle, but the previous history differed considerably; for abscess is not formed so soon after birth, makes slower progress, is irritable and painful, and the condensed cellular membrane does not form so hard a boundary as bone.

4. The ordinary caput succedaneum is softer, pitting on pressure, but not fluctuating, not so defined, without the bony circle, and is speedily dissipated. The sub-aponeurotic cephalæmatomata are more rapidly formed, the skin is discolored, the tumor is sometimes painful, but not circumscribed, and without the bony circle. M. Dubois saw in the same child the sero-sanguineous tumor, the sub-aponeurotic, and the sub-pericranial cephalæmatomata, the coexistence of which would, of course, embarrass the diagnosis.

SUB-CRANIAL CEPHALÆMATOMA.

This variety is extremely rare. Hœre was the first to describe it,* and since then MM. Moreau and Dubois† have detailed each a case. M. Baron states that he has seen several; and M. Padiou showed to M. Valleix the parietal bone of an infant, which had been the seat of one.‡ M. Valleix has found the dura mater separated by effused blood, but which was not limited so as to form a tumor. The blood is stated by Chelius and others to be effused into the diploe of the cranial bones; by others, on the external or internal surface of the dura mater.

Dr. West, of London, has published a very interesting case of external and internal cephalæmatomata, with fracture of the frontal bone. The child died twenty-three or twenty-four days after birth, of convulsions. The tumor was about the size of a walnut originally, but it extended so as nearly to cover the right parietal bone. On dissection the tumor was found filled with coagulated blood, underneath which was "a semicircular layer of dense, reddish, fibrinous exudation, about three lines broad, wedge-shaped, with its narrow edge directed inwards." The subjacent surface of the bone was rough and uneven. The right parietal bone was then removed, but previously a fissure, with clean edges, was noticed in the bone, running from the coronal suture obliquely backwards and upwards. "On the inner sur-

* De Tumore Cranii, &c.

† Dict. de Méd., Art. Cephalæmatome.

‡ Mal. des Enfants, p. 515.

face of the bone was an effusion of blood between the cranium and the dura mater, more than half an inch in thickness, and occupying the whole of the fossa of the parietal bone." "Between the two layers of the dura mater by which it was covered, were numerous bony deposits, and a ring of newly formed bone surrounded its base."* Dr. West thinks, and I believe correctly, that the fracture occurred during labor, although it was quite natural and easy. Such occurrences have been noticed by D'Outrepont, Carus, Høere, and Danyau. They are still more likely, and more easily explained, when the pelvis is narrowed by undue projection of the sacral promontory, as in Monde's Adelman's, and Beecher's cases.

Pathology.—In describing the appearances in sub-pericranial cephalæmatoma, discoverable in dissection, I shall give the substance of M. Valleix's researches, which are by far the most minute and accurate of any.

The scalp has generally its natural aspect, although Osiander and others speak of its being red or livid. Its substance is always uninjured. The pericranium preserves its transparency, and through it is perceptible the deep color of the effused blood. M. Dieffenbach† has noticed a thickening of the pericranium, which is confirmed by M. Valleix. At the circumference of the tumor the pericranium is adherent to the bony circle, but it is never ossified itself, according to M. Valleix, although Chelius has found it so. According to M. Valleix, the effused blood is enveloped in a sac formed of a fine membrane, having all the characters of condensed cellular tissue, around which he observed an adventitious tissue, consisting of a cartilaginous plate, varying from a line to half an inch in breadth, and about half a line in thickness, gradually thinning externally. It is placed on the bone, from which it is easily detached, and underneath the pericranium, to which it adheres more firmly, but from which it can be detached, leaving the membrane in its natural state. In the under surface of the cartilaginous plate, points of ossification may be observed.

The state of the bone underneath the tumor has been differently described by different authors. Michaelis and Palletta, who attribute the affection to disease of the bones, think that the outer table of the bone is necrosed, carious, and destroyed, and that the injured vessels of the diploe give rise to the hemorrhage. Naegelè, Zeller, Høere, Valleix, and others, differ from this view, and their opinion is founded upon examinations made after incisions have been practised and after death. Valleix found part of the surface smooth, but sprinkled with numerous irregular osseous rugosities, very difficult to be detached, but neither carious nor destructive. The bony circle always surrounds the tumor entirely, except when it is seated near to the suture: it con-

* Transactions of Med. Chir. Soc., vol. xxviii.

† Abscessus Capitis Sang. Neonat.—Rust's Magazin, 1839.

sists of a bony ridge placed upon the bone, from which it may easily be detached, exposing the parietal bone unaltered. It appears of different degrees of consistence, according as the process of ossification is more or less advanced. Its height varies in different cases, and in different parts of the circle, varying from half a line to a line and a half.

Terminations.—Velpéau gives the following statement from Nægelè as the process of cure:—

“1. The detached pericranium becomes ossified on its internal surface.

“2. In proportion as the effused blood is absorbed, the ossified pericranium approaches the cranium, and at length is united to it.

“3. After six months, or even a year, we may still remark an elevation at the place where the tumor was situated.

“4. In children who died six months or a year after, M. Nægelè found, on making a section of the parietal bone, that it was much thicker at the situation of the tumor.”* M. Valleix states, that in one case the bony circle gradually increased internally, until it nearly occupied the whole extent of the tumor, and that fluid disappeared in the same degree.

The tumors, if untouched, are rarely cured within forty days; they may, however, disappear, though not often without opening, and in the majority of cases there is no danger.

Treatment.—I have already stated that for the simpler forms nothing beyond cold lotions or spirit wash will be necessary, unless ulceration take place, or an abscess form. The same treatment may be tried in the subaponeurotic cephalæmatomata, and will generally succeed. Even the sub-pericranial tumors may be dissipated, according to Gölis, Rau, Halmagrand, and others, when slight. The latter author speaks highly of a lotion of the hydrochlorate of ammonia in red wine. Others recommend the usual cold and spirituous lotions. Henschel recommends pressure.

If these means fail, and they will fail if the tumor be large, it will be necessary to make an opening into it. For this purpose Moscati and Palletta passed a seton through the tumor to provoke suppuration, on the supposition that the bone was diseased. Gölis of Vienna establishes a slight issue on the top by means of caustic potash, in hopes of promoting absorption; and he cites thirty-two cases of cure by this means, in from fourteen to eighteen days; but Zeller throws great doubts upon some of these; Krukenberg and Schmitt, however, adopt Gölis's plan. Löwenhardt recommends puncture with a trocar, and strapping. By far the simplest mode, however, is to make an incision with a bistoury, sufficiently ample to evacuate the contents of the tumor; and by most writers this plan is preferred. The wound may

* Art. des Accouchemens, p. 512.

be dressed with charpie, according to Chelius, or with spermaceti cerate; or, when the blood is evacuated, a strap of plaster may be passed across it. The simpler the dressing the better. I may remark, in conclusion, that we should take care not to make the incision near any of the principal arteries of the scalp; and also that in a case I saw where this rule had been observed, there was hemorrhage sufficient to require pressure.

I give the following notice by Dr. Schöller, of Berlin, of a case of injury arising from pressure, although it does not properly belong to any of the varieties of swelling on the scalp just described, on account of its rarity and interest. "A healthy young woman was seized with labor of her first child, August 23, 1839. The first stage was very tedious, and the pelvis very small. At the end of three days, and after the use of venesection and opium, she was delivered of a small child. Its head was a quarter of an inch smaller than usual in each diameter; a large caput succedaneum occupied the right parietal bone; and in the middle of the left parietal, and in the neighbourhood of the left temple, the skin was abraded and the bone depressed. The skin about these parts became gangrenous, and a red line of demarcation surrounded the mortified structures. The bone beneath likewise died, and a portion as large as a sixpence of the whole thickness of the parietal bone exfoliated, leaving the dura mater exposed. The destruction of the frontal bone was less considerable, and was replaced by granulations which, on September 13, had likewise advanced so far towards restoring the lost part of the parietal bone that the child was dismissed from hospital."* A similar case is recorded by Meine in his thesis *De Osteomalacia et ejus in partum actione*.

CHAPTER III.

IRRITATION OF THE NERVOUS SYSTEM.—TRISMUS NASCENTIUM.

NERVOUS IRRITATION.

WHEN we consider the delicate structure of the brain in infants, the great vascular action going on therein, the influence reflected upon it from the different organs, and the stimulation to which it is exposed from external impressions, we cannot be surprised that it should be

* Medicinische Zeitung, September 22, 1841.

liable to various degrees of disturbance, from simple irritation up to disorganization. Some of these attacks are apparently merely functional, *i. e.* they entail no permanent disorder and leave no pathological traces in the structure of the organ, so far as we can ascertain. They do not amount to inflammation, but consist probably in temporary irritation, with probably some degree of congestion or unequal circulation. Without attempting to explain further what we confessedly do not as yet understand, I shall proceed to notice the ordinary forms of nervous irritation occurring in infants and young children.

In very mild cases the principal symptoms are great wakefulness and a keen sensibility to slight impressions, much restlessness and rather more animation than usual. In severer cases these symptoms are aggravated; the infant sleeps very little, and is awoken by the slightest movement; is painfully sensitive to sound and light: the temper becomes irritable, and it is scarcely possible to please the child; it cries on the slightest occasion, and is only soothed when at the breast. It is restless, keeping the limbs in constant motion, and requiring the nurse to walk about with it constantly. Its sleep is not the calm rest of a healthy infant; it starts now and then, a frown passes over its forehead, the eyelids are occasionally squeezed together, and the least noise disturbs it. The arms are tossed about, and the lower limbs frequently moved. The bowels in some cases are regular, but more frequently they are deranged, either confined or relaxed, or the motions exhibit an unhealthy character. The pulse is quicker than natural, and the heat of the surface increased. So far these symptoms resemble very closely those which usher in convulsions, neither can we be sure that any case in which they are present may not thus terminate, although, if promptly and judiciously treated, the attack may generally be arrested.

But nervous irritation may show itself in another form, and with somewhat opposite characters. The infant is heavy and dull, yet fretful when disturbed or touched; it is uneasy except when resting the head on the nurse's arm or on its pillow; it does not sleep, and yet is scarcely awake; there is a great indisposition to move or make any exertion, with an indifference to all objects. The eyes are dull and frequently rolling or turning upward with an occasional wide stare; the child is restless, tossing its arms, and moving its legs about uneasily; starting in its sleep, and awaking crying, or as if frightened. There is a general pallor and chilliness of the body; the face is of a dull lead color and darker underneath the eyes. The heat of the head may be natural, or slightly increased. If its course be not arrested, this form of irritation of nervous system may run on into convulsions; for this very reason, it would appear, writers have generally omitted to notice these attacks, regarding them, doubtless, as the first stage of convulsions; but I have seen them so frequently stopping short of that extreme, either spontaneously or under the influence of treatment, that I felt it right to allude to them separately. Dr. Whitlock Nicholl has

published a monograph* on the subject, containing much valuable matter, which the reader would do well to consult.

The late Dr. Gooch has described,† with his usual discrimination, a class of cases in which the “symptoms are erroneously attributed to congestion of the brain,” and which closely resemble the last form of nervous irritation. “It is chiefly indicated by heaviness of head and drowsiness. The age of the little patients whom I have seen in this state has been from a few months to two or three years; they have been rather small of their age, and of delicate health, or they have been exposed to debilitating causes. The physician finds the child lying on its nurse’s lap, unable or unwilling to raise its head, half asleep, one moment opening its eyes, and the next closing them again, with a remarkable expression of languor. Its tongue is slightly white, the skin is not hot; at times the nurse remarks that it is colder than natural; in some cases there is at times a slight and transient flush; the bowels I have always seen already disturbed by purgatives, so that I can scarcely say what they are when left to themselves: thus the state which I am describing is marked by heaviness of head and drowsiness, without any signs of pain, great languor, and a total absence of all active febrile symptoms. The cases which I have seen have been invariably attributed to congestion of the brain, and the remedies employed have been leeches and cold lotions to the head, and purgatives, especially calomel. Under this treatment they have gradually become worse, the languor has increased, the deficiency of heat has become greater and more permanent, the pulse quicker and weaker, and at the end of a few days or a week, or sometimes longer, the little patients have died with symptoms apparently of exhaustion. In two cases, however, I have seen, during the last few hours, symptoms of oppressed brain, as coma, stertorous breathing, and dilated, motionless pupil.” Dr. Marshall Hall has also described a similar form of disease, attributing it to the same causes. Dr. Abercrombie remarks: “I have many times seen children lie for a day or two in this kind of stupor, and recover under the use of wine and nourishment. It is scarcely to be distinguished from the coma which accompanies diseases of the brain. It attacks them after some continuance of exhausting diseases, such as a tedious and neglected diarrhœa; and the patients lie in a state of insensibility, the pupils dilated, the eyes open and insensible, the face pale, and the pulse feeble. It may continue for a day or two, and terminate favorably, or it may be fatal.”‡

Dr. Whitney, in a valuable paper on cerebral auscultation, mentions

* Practical Remarks on Disordered States of the Cerebral Structures, occurring in Infants, p. 10. 1821.

† Diseases of Women, p. 357.

‡ Diseases of the Brain, p. 310.

that in such cases he has detected a bellows-sound in the arteries of the head, with a rasping, chirping sound occasionally; and he regards these sounds, in combination with the anæmic condition of the patient, as characteristic of the disease.* I have not been equally successful in hearing these sounds, nor in deciding upon the value of cerebral auscultation. Perhaps further investigation may throw some light upon the subject.

Now, as an organ may be in a state of irritation from a deficient as well as from an excessive supply of blood, either error destroying its healthy equilibrium, I do not know a better term by which to indicate both conditions than nervous irritation; but, whatever nomenclature we use, they are to be observed in practice, and are of considerable importance.

Causes.—In the first variety, I think, there will generally be found some disorder of the stomach or bowels, or both. The child may have been eating some indigestible food, or, without any special cause, the mucous membrane of the stomach and bowels has become deranged, and there is occasional vomiting, or purging, not of large but of small and frequent stools, with great flatulence.

In some cases, no exciting cause can be detected; but the attack seems to be the commencement of some serious affection of the nervous system, presenting the character and symptoms I have described, and either subsiding spontaneously or from judicious treatment, or really developing itself in a graver form, or lastly, as it were, projecting itself upon some other organ, and giving rise, *e. g.*, to spasm of the glottis.

In the second variety, where torpor is the characteristic symptom, the cause seems to be a feeble state of constitution, and exhaustion from some other disease, as diarrhœa, increased by treatment of the primary affection, or that which has been erroneously directed to the cure of supposed cerebral disease.

Treatment.—In the first variety, if the pulse be quick and firm, and there be any heat of the scalp, I have found immediate and great relief from the loss of a *small* quantity of blood by leeches. And as this is the first time I have had occasion to mention leeches, let me recommend to my readers that, *in all cases where they are applied to infants or children, the bleeding should be arrested at once when they fall off.* By so doing, we can estimate exactly the amount of blood lost, and we avoid the great mischief of continued draining. Of course, it will be necessary to apply a greater number of leeches than usual, or to repeat them; but that is of no consequence compared with the danger of the ordinary method. Each leech will abstract from one to two drachms of blood, and the number must be proportioned to the

* American Journ. of Med. Science, Oct. 1843, p. 318.

amount we wish to take away; and, in the following pages, when speaking of the number of leeches to be applied, I must request the reader to bear this in mind, and that I do not include any subsequent draining from the leech-bites.

After leeching, or, if that be unnecessary, sponging the head with cold water, or a cold lotion, and a warm foot-bath at bedtime, will calm and soothe the infant, and perhaps procure for it some refreshing sleep.

The state of the stomach and bowels demands immediate attention. If they are too free, as well as disordered in the character of the evacuations, it is better first to quiet the excessive action before attempting to correct the secretions; and I have found for this purpose the following simple mixture of great use. The proportions are, for a child of twelve or fourteen months old,

R.—Mucilag. acaciæ,
Syr. zinziberis, āā ʒij.
Tinct. opii, gutt. j to iij.
Aquæ carui vel anisi ʒj.—M.

A teaspoonful may be given every three or four hours until the bowels are quieter, and then at longer intervals; or we may substitute tincture of hyosciamus for the laudanum. When the bowels are steady, the mercury with chalk, with the addition, if necessary, of a little compound powder of chalk, may be given; or, instead of the grey powder, minute doses of calomel—say one-sixth of a grain. The diet should consist of milk, thin arrowroot, panada, &c., without stimulants; but, when the irritation subsides, a little broth may be given.

In some cases, I have seen great benefit result from a small blister applied for an hour or two behind the ears, across the forehead, or at the nape of the neck.

For the second variety, neither depletion nor any exhausting remedies are admissible; on the contrary, it is absolutely necessary to administer good although bland nourishment. Chicken broth, nicely made beef-tea, or beef gravy must be given frequently, but in small quantities; and, after a time, a little wine whey or wine and water. Ammonia, ether, bark, or some other tonic, will generally be found useful. If the bowels are irritable, some soothing medicines must be given; and the head may be sponged with cold lotion, if it be hot, or a foot-bath used.

TRISMUS NASCENTIUM.—NINE-DAY FITS.

This disease, which consists in intense cerebro-spinal irritation, seems peculiar to hot climates, to certain localities in more temperate

climates, and to vitiated atmospheres. It is frequent in Jamaica and the West Indies, according to Dr. Evans and James Clarke,* in Cayenne, Minorca, and some parts of Germany. Dr. Schneider was called to six cases within fourteen days, in March, 1802, in the town (Fulda) in which he resides; and he states that a midwife of the same place met with more than sixty cases in nine years.† The town is situated close to the river, and very damp; so far bearing out the truth of Sauvages' observation, "hic morbus hieme, et cum aurâ humidâ advenit quàm sicca æstate."‡ It only occurred once in the British Lying-in Hospital in many years;§ and Capuron mentions that he *once* met it in Paris. M. Matuzinski has recorded that, in the Hospital of Stuttgart, from 1828 to 1835, among 848 children, there were 25 cases of trismus, or about 1 in 34.|| In a letter to the editors of the *New Orleans Medical and Surgical Journal* for May, 1846, Dr. Wooton states that it is of fearful frequency in the cotton plantations in Alabama. He believes that it destroys more negroes than any other disease, always proving fatal; but he has never seen a white child attacked.¶ In private practice, it is rarely met with, even amongst the poor; so that, of the writers who have noticed the disease, very few seem to have seen an example of it.

No institution, so far as I know, has ever afforded such ample experience of the disease as the Dublin Lying-in Hospital, before the improvements in ventilation and cleanliness, introduced by the late Dr. Joseph Clarke, to whom we are indebted for the best description of the attack.

He states that those children who were observed to whine and cry very much from their birth, or who started much in their sleep, were more liable to the disease. Twisting of the limbs without cause when awake, a livid circle about the eyes, sudden changes of color, screwing up the lips like a purse, involuntary smiling, with a peculiar kind of screech, were certain and not distant precursors. Previous to, or along with these symptoms, the infants were greedy for the breast or for food, the bowels were easily moved, and the evacuations were sometimes natural, at others greenish, slimy, or knotty. "Generally with one or more of these symptoms preceding, but sometimes without any warning whatever, the infants are seized with violent irregular contractions and relaxations of their muscular frame, but particularly those of the extremities and face. These convulsive motions recur at

* On the Yellow Fever, 1797.

† Edinburgh Medical and Surgical Journal, vol. vii. p. 225.

‡ Nosolog. Method., vol. i., p. 531.

§ Underwood on Diseases of Children, p. 280.

|| Gaz. Med., 1837, p. 338.

¶ Transactions of the College of Physicians of Philadelphia, 1847, p. 115.

uncertain intervals, and produce various effects. In some the agitation is very great; the mouth foams, the thumbs are riveted into the palms of the hands; the jaws are locked from the commencement, so as to prevent the action of sucking and swallowing; and any attempts to wet the mouth or fauces, or to administer medicines, seem to aggravate the spasms very much; the face becomes turgid and of a livid hue, as do most other parts of the body. From this circumstance, and from the shorter duration of the disease, when it occurs in this form, the nurses reckon this a different species, and call it the 'black fits.' The conflict in such cases lasts from about eight to thirty hours, and in some very rare cases to about forty hours, when the powers of nature sink, exhausted and overpowered, as it were, with their own exertions."*

There is a milder variety, to which the nurses give the name of "white fits," in which the convulsive movements of the extremities are less violent, the paroxysms less frequent, and the power of sucking and swallowing, although enfeebled, is not lost until near death. The attack is also more prolonged, lasting from three to nine days. The face remains pale, and the body is greatly emaciated.

Both forms of the disease certainly attack the infant within nine days, and generally about the period when the remains of the umbilical cord fall off; and both are distinguished from other varieties of convulsions by the permanent difficulty or impossibility of swallowing, hence the more appropriate name of Trismus Nascentium (rather than the popular one of nine-day fits); for the attack, as Mr. Colles has truly observed, resembles very closely tetanus in the adult. He and others have also remarked, that plump, healthy-looking children are as liable to the attack, as the delicate and weakly.

Causes.—M. Bajan attributes the prevalence of Trismus on the coast of Cayenne to cold and the sea wind, as it is unknown in the interior; Dr. Evans to costiveness; Dr. Bartram to improper swathing and the application of scorched linen to the navel; Dr. James Clarke to the smoky, unventilated state of the huts of the negroes in Jamaica; Dr. Underwood to impure air. Dr. Joseph Clarke enumerates three especial exciting causes of the disease: first, impure air; second, neglect of keeping the infants clean and dry; and third, irregularity of living on the part of the mothers, especially the abuse of spirituous liquors. But it is to the first of these that Dr. Clarke chiefly attributes it, because of its frequency in hospitals, and infrequency among the poor who are delivered at their own homes, where want of cleanliness and irregularity are more remarkable than in any hospital. At the end of the year 1782, of 17,750 infants born alive in the Lying-in Hospital, 2944 had died within the first fortnight, or nearly every sixth child, and that mainly of trismus. After the precautions he adopted

* Transactions of the Royal Irish Academy, vol. iii., p. 92.

to secure pure air and adequate ventilation in the hospital, out of 8033 born alive only 419 died in the hospital, or one in 19 $\frac{1}{3}$. And Dr. Collins states, that out of 131,227 children born alive only 5500 have died*, a very striking evidence of the correctness of Dr. Clarke's opinion of the value of his preventive treatment. During Dr. Collins's mastership there only occurred thirty-seven cases of trismus out of 16,654 infants born.

Pathology.—It is much easier to determine the predisposing and exciting than the proximate causes. Different opinions have been held by different practitioners of high estimation as the following summary will show. The late Professor Colles attributes trismus to inflammation and ulceration of the umbilicus, without, however, denying that it may be connected with a vitiated state of the atmosphere; and he grounded his opinion upon repeated dissections: "Five years ago," he observes, "I first made a careful dissection of the umbilicus of a child who had died of locked-jaw, and I have every year since dissected from three to six subjects who had fallen victims to this disease."† From fifteen to thirty *post-mortem* examinations constitute evidence very well worthy of attention; I shall, therefore, extract his account of the appearances observed: "The skin forming the edges of the umbilical fossa was in some a little more raised than usual. When the borders of this hollow were expanded by introducing a pair of dissecting forceps, we observed the floor of this cavity not flat, but considerably raised in the centre by a knob or large papilla; both the central raised part and the surrounding flat parts of this surface, presented all the characters of those new membranes which are formed by suppurative inflammation. In some few instances, the fundus of this cavity presented evident marks of superficial ulceration, confined to the vicinity of the umbilical vein. A probe readily passed through the substance of the central tubercle, and entered into the umbilical vein. On cutting into the abdomen the peritoneum covering the umbilical vein was highly vascular, as if from inflammation; this extended sometimes up to the fissure of the liver, often, however, not for a greater length than one inch above the umbilicus. The peritoneum in the course of the umbilical arteries appeared to be still more inflamed, an appearance which extended often as far as the sides of the bladder. Besides the appearance of the peritoneum along their posterior surface, the cellular substance which covered them and the urachus anteriorly, was loaded with a yellow watery fluid, even down to the bladder. Leaving the umbilicus untouched, if we cut open the umbilical vein from the liver to the vicinity of the umbilicus, we found only a few small coagula within its canal; the inner surface of the vein was pale, and free from any marks

* Practical Treatise on Midwifery, p. 514.

† Dublin Hospital Reports, vol. i. p. 286.

of inflammation, yet the coats of the vein altogether were very much thickened. The umbilical arteries exhibited evident marks of inflammation: first, on slitting them up, a thick, yellow fluid, resembling coagulable lymph, was found within their coats; second, in all cases their coats were much thickened and hardened, even as far as the fundus of the bladder. On cutting into the umbilicus itself, from its posterior or peritoneal surface, we found in the centre a space about half an inch long, occupied by a soft yellow substance, which bore a very strong resemblance to coagulable lymph produced by inflammation; it was this which formed the prominence observed in the external veins of the fossa. The extent of this middle space varied in different cases, but in every instance the arteries opened into it, or rather were lost upon it. The extremity of the umbilical vein was affected in different degrees in various instances. In some it presented a pouch or varix, which extended one-eighth of an inch below the extremity of the opening of the vein, *i. e.*, in a direction towards the opening of the bladder. In some the extremity of the vein presented an appearance of ulceration on its margins; and all the edges of the extremity of the veins were thickened. In every instance the ends of all these vessels remained open; their canals were in continuity with the soft substance which occupied the centre of the umbilical space, so that a bristle or small probe passed without opposition from their vessels into the soft substance.”*

In the year 1819, Dr. Labatt, then Master of the Lying-in Hospital, published a paper† to refute Mr. Colles's views, in which he gives memoranda of nine dissections of infants, six of whom died of trismus, two of diarrhoea, and one of an affection of the chest. The peculiarities mentioned by Mr. Colles as characteristic of the navel in trismus he states to have been absent in all the cases of locked jaw, and many of them present in the other cases, so that in the former the umbilicus appeared to be perfectly free from disease.

Dr. Breen, in a valuable paper published some time afterwards,‡ coincides in a great measure with Dr. Labatt; and Dr. Collins observes, that “from dissection we have never been able to discover any morbid appearances which would justify us in offering any explanation of the pathology of this disease.”§

It is an old opinion, however, that the disease is in some way connected with the condition of the umbilical cord. Moschion thought that stagnation of blood in the funis might give rise to serious disease; with which Levret agreed; and M. Bajon expressly attributes trismus

* *Loco citato*, p. 286.

† *Edinb. Med. and Surg. Journal*, vol. xv., p. 216.

‡ *Dublin Journal*, vol. iii., p. 548.

§ *Practical Midwifery*, p. 516.

to this cause, and advises that the blood should be carefully emptied out. Alphonse Le Roi fancied that it might be caused among the negro children by the use of dirty, rusty scissors for dividing the cord.*

Dr. Wooton made careful investigations on this point, but could come to no definite conclusions. The pathological phenomena he observed were general peritonitis, and the portion surrounding the entrance of the navel-string in a gangrenous condition; liver engorged; and heavy engorgement of the membranes of the base of the brain, and along the medulla oblongata and cervical portion of the spinal cord.

M. Ollivier, in his excellent work on diseases of the spinal marrow, states that he has no doubt that trismus is in many cases identical with tetanus from hemorrhage into the spinal canal; and he refers to a case of Dr. Abercrombie's, of an infant six days old, who presented symptoms resembling trismus, of which he died on the fourth day; and on dissection, "in the spinal canal there was found a long, and very firm coagulum of blood lying between the bones and membranes of the cord on the posterior part, extending the whole length of the cervical portion."†

Dr. Evory Kennedy has contributed another case,‡ and Professor Doherty two cases, in which sanguineous effusion was found to a considerable extent in the spinal canal, and especially in the cellular tissue surrounding the dura mater.§

M. Billard, without pronouncing a positive opinion, mentions that he had seen but two cases of this disease, and that in both the only pathological condition was an effusion of blood into the spinal arachnoid membrane, filling the space from the medulla oblongata to the sacrum; and he is inclined to believe that this was the cause of the trismus.||

The results of *post-mortem* examinations made by Matuzinski are stated as follows: Out of twenty cases, he found in sixteen a semi-coagulated fluid in the spinal canal between the dura mater and the vertebræ; in some cases the fluid was limited to the cervical, dorsal, or lumbar region; in many cases the coagulum, equally thick throughout, separated the membranes all round from the bony canal; the dura mater was healthy except in one or two places, where it was thickened and red; the arachnoid was normal; the pia mater constantly much injected, and occasionally thickened; the spinal marrow was very red in two cases, softened in one case, and indurated in another, but, with these two exceptions, perfectly healthy.¶ He agrees with Mr. Colles

* Gardien, *Traité des Accouch.*, vol. iv., p. 244.

† *Traité des Maladies de la Moëlle Epiniere*, vol. ii., pp. 106, 136.

‡ *Dublin Journal*, vol. vi., p. 467.

§ *Dublin Journal*, vol. xxv., p. 75.

|| *Mal. des Enfants*, p. 689.

¶ *Mal. de l'Enfance*, vol. ii., p. 478.

in attributing the disease to the condition of the umbilicus after the fall of the funis, aided by the action of cold.

Dr. Sims, of Alabama, has published three very valuable papers on this disease, which I am sorry I omitted to notice in the former edition. His conclusions differ widely from those of the authors I have already quoted. He considers that trismus nascentium "is the result of mechanical causes; the predisposing being protracted or tedious labor, but particularly a too well ossified state of the fœtal cranial bones. The *exciting* cause is undue pressure on these bones, more especially on the occiput; while the immediate cause is undue compression of the medulla oblongata, and the nerves originating from it."* The cases he divides into two great classes, in one the occiput being displaced inwardly, with its edges overlapped by those of the parietal bones; in the other the occiput occupied its natural position on the outside of these bones, but pressed upwards by the mode of decubitus, which in the latter was on one side or the other; but in the former on the back, or in the semi-lateral position. In Dr. Sims's first paper he considered that this inward displacement of the occipital bone gave rise to congestion, and then rupture of the minute spinal veins; and the *post-mortem* appearances in several cases seemed to justify the conclusion; but in the latter paper he has given up this opinion, and now considers the condition produced by both kinds of displacement to be pressure of the pons and medulla oblongata against the cuneiform process of the occipital bone, and that "the fifth, seventh, eighth, and ninth pair of nerves are compressed, pinched, stretched, or thrown into folds, near their several points of convergence from the cranium; and he takes great pains to show how the various symptoms would result from such pressure. The best argument Dr. Sims adduces is the success of his treatment, of which I shall speak hereafter.

Professor Busch, of Berlin, and Dr. Levy, of Copenhagen, attribute the attack to inflammation of the umbilical arteries; and the latter gives six cases with dissection, in confirmation of this opinion; in all there was discoloration and suppuration of the coats of the arteries, and in some the coats were destroyed, but the division did not extend up to the point where the umbilical unite with the hypogastric arteries.†

Thus we find, 1. That in certain cases presenting symptoms of trismus there is effusion of blood or serum in the spinal canal.

2. That in similar cases there have been found traces of inflammation, or its results.

3. That in some cases, according to Dr. Sims, pressure upon certain parts of the cerebro-spinal system gives rise to symptoms of trismus, which are relieved by taking off the pressure.

4. That, in the opinion of many careful observers, the condition of

* American Journal of Med. Science, for April 1846, July 1848, and October 1848, p. 362.

† Brit. and For. Med. Review, vol. x., p. 275.

the umbilicus, after the fall of the cord, has an evident connection with the production of the disease.

5. That some cases seem referable to irritation of the mucous surfaces.

6. That dampness, impurity of the atmosphere, cold, alterations of temperature, &c., have a very direct agency in the production of this disease, as is proved by the situations in which it prevails, and by the success of Dr. Joseph Clarke's preventive treatment.

Now, instead of trying to reconcile these differences of opinion, and to discover one cause for all cases, it appears to me much more philosophical to admit that there may be several which may give rise to the same symptoms. Those conditions which I have first mentioned, may be divided into centric and eccentric causes, and are very intelligible when explained by the discovery of Dr. Marshall Hall. The irritation from these various sources is conveyed by the excitor nerves, and its effects upon the spinal system are reflected by the motor nerves to the organs affected in the disease; but there is nothing which could lead us to suppose that these effects must result from one local cause only.

Whatever may be the exciting cause, there can be no doubt that the proximate cause is intense cerebro-spinal irritation, and which may leave no trace of disorganization in the brain or spinal marrow.

Treatment.—A more intractable disease does not come within our observation. Dr. Collins remarks: "With respect to the treatment I have nothing to propose, as I have never seen an instance where the child seemed even temporarily relieved by the measures adopted. Calomel has been tried in large quantity, also in small doses often repeated, as well as extensive friction with mercurial ointment. I have tried frequent leeching above the spinal column, also repeated blistering over its entire length. Opium I have also exhibited in many ways, both in very large and small doses; also tartar emetic in the same manner, and at times both combined. I have tried tobacco extensively, in the form of stupes and injections of various degrees of strength, from one grain to the ounce of fluid, to five or more, besides the frequent use of the warm bath, oil of turpentine, tincture of soot, assafoetida, and many of the ordinary purgatives and stimulants; and all, as far as I could judge, without a shade of relief."

In accordance with his view of the cause of this disease, Professor Colles advises that our attention should be directed to the umbilical cord. He mentions that he had been informed that in Jamaica, where this disease was formerly frequent and fatal, it is now rarely to be met with, and that the means used are, to plunge the infant daily into a cold bath, and daily to dress the umbilical cord with spirits of turpentine. He suggests that this might be tried here, and inquires whether tying the cord nearer to the abdomen might not induce a more healthy and active inflammation, by which trismus might be avoided.

Dr. Breen seems to be more hopeful of the cure of at least some

cases; his panacea is small doses of laudanum, with calomel and castor oil. "When the complaint develops itself, I order one drop of laudanum in an ounce mixture, and of this I direct a teaspoonful to be taken every second hour, until the patient appears to be affected with the narcotic properties of the opiate, which often happens after the third dose; then the mixture is given less frequently. A grain and a half of calomel is also administered every fifth or sixth hour up to the third time, afterwards it is not given more frequently than twice or three times in twenty-four hours, with intermediate doses of castor oil, in the quantity of a large-sized teaspoonful, sometimes joined with a third part of spirits of turpentine, which appears to me to quicken the action of the former. I also occasionally order three ounces of the assafoetida clyster of the Dublin Pharmacopeia to be thrown up the rectum." Under this treatment the paroxysms diminish in force and frequency. Nurse's milk must be given, and as the effect of the opium is weakened by use, the dose must be increased; but Dr. Breen has never found it necessary to give more than three drops in a two-ounce mixture. Occasionally at night he found it useful to substitute a grain of *pulv. cretæ comp. cum opio*, with a grain and a half of calomel. He records two cases occurring in one year, that recovered under his own care by this plan of treatment, and one under the care of Dr. Graves.

Gardien advises frictions with warm oil and laudanum, opium internally, and counter-irritants.

Dr. Schneider recommends compound tincture of musk and ambergris as having been of great use. The following is the formula employed in the hospital at Bamberg:—

℞.—Ambr. gris. ʒj.

Æther. vitr. ʒss.

Stet per horas xij sæpe agitando, dein adde,

Mosch. ʒj.

Liq. anod. Hoffm. ʒiij.—M.*

Mr. Chalmers mentions that he had succeeded in one case by a combination of rhubarb and musk. Barrier and Bajon tried warm douches and cold baths, embrocations, oil of almonds, and syr. diacod., but in almost all cases were unsuccessful.

Mr. Furlong succeeded in one case by giving at first a drop of laudanum three times a-day, and a warm bath four times a-day, dressing the navel with turpentine and mercurial ointment, blisters to the nape of the neck, and two grains of Dover's powder with five grains of the sulphate of zinc.† He attaches much value to the zinc, but with such complex treatment it is quite impossible to say to which remedy we are to attribute the success.

* Edin. Med. and Surg. Journ., vol. vii. p. 225.

† Ibid, vol. xxxiii. p. 57.

My friend Dr. M'Clintock suggests, and I think with sound reason, a trial of the tincture of the Indian hemp in this affection. He has tried it in a limited number of cases, and it seemed to lessen the severity of the fits, and retard the progress of the disease.

In order to remedy the pressure produced by the occipital bone when displaced inwardly, Dr. Sims places the child fully on its side on a pillow, and he states that the relief is obvious in most cases, but when ineffectual, he recommends that the top of the bone should be elevated and placed in its proper position outside the parietal bones. When the displacement is outward, the child should be held erect as much as possible, and when laid down placed in the post-parietal position. I have no reason to believe that displacement is as frequent in these countries as Dr. Sims found it in America, but it is impossible to read his cases and doubt either that they were trismus, and that they were relieved if not cured by the relief from pressure afforded by the change of position.

These, I think, are the principal modes of treatment, and very sad it is to think how ineffectual they generally are. The principles we should ever have in view are to direct our attention to the exciting cause of the irritation, and remove it if possible, and next to apply all our efforts to calm the irritation already excited.

With a disease in which such faint hopes of a cure can be entertained, it becomes the more necessary to attend to such methods of prevention as have been found successful. Dr. Joseph Clarke's improved ventilation and attention to cleanliness, we have seen, had a striking influence in reducing the number of cases and in diminishing the fatality, which decrease has continued, under successive Masters of the Hospital, until the present time, by the adoption of similar precautions. Each ward of an hospital ought to have an ample supply of fresh, pure air, by day and night, with the means of escape for vitiated air. A moderate number of beds in each ward, so as not to overcrowd it, is also necessary. In the Western Lying-in Hospital, to which I was many years attached, the disease was almost unknown.

In private practice trismus nascentium is exceedingly rare, because the more obvious and frequent cause is seldom present; however as it does occur, it will be well to try Dr. Breen's plan of treatment.

CHAPTER IV.

CHOREA.—ST. VITUS'S DANCE.

THE second name (St. Vitus's dance) given to this disease is said to be derived from a chapel at Ulm, built in honour of St. Vitus, who was himself affected with the disease, and which was visited in hopes of a cure by persons similarly afflicted.

Without being limited to the period of childhood, it is nevertheless more frequent then than afterwards, occurring chiefly from the second dentition to puberty, or between the ages of seven and fifteen years, although we now and then see it in persons advanced in life: for example, Crampton met with it in a female upwards forty years of age; Copland in a man upwards of fifty; Powell and Maton in females of seventy; and Bouteille in one of eighty years. It is also three times as frequent in females as in males. "Everything is extraordinary in this disease," M. Bouteille observes in his preface; "its name is ridiculous, its symptoms singular, its character equivocal, its cause unknown, and its treatment problematical." The definition given by Dr. Copland, in the learned article in his Dictionary, to which I have been much indebted, is the following: "Tremulous, irregular, involuntary, and ludicrous motions of the muscles of voluntary motion, more marked on one side than the other, without pain, occurring in both sexes, more frequently in the female, and chiefly between eight and fifteen years of age."*

Chorea was known to the ancients, a disease closely resembling it having been described by Galen. It is noticed also in the writings of Plater, Horstius, and Sennert. From its striking peculiarities it has at different times been attributed to demoniacal possession, or included among feigned diseases, and an affection very like it seems occasionally to have prevailed epidemically in Scotland and America.

Symptoms.—In some cases the attack comes on suddenly, without previous illness of any kind, but more frequently for some days the stomach and bowels are disordered, the spirits depressed, temper irritable, with frequent sighing. These symptoms are followed by irregular and involuntary motions or twitchings of the muscles of one side of the body, more frequently the left or of one superior extremity, or of the face; very slight at first, but gradually increasing and extending to one of the lower extremities, so as to impede walking, or render it

* Dict. of Pract. Med., Part i. p. 327, Art. Chorea.

unequal or jerking. By and bye these chronic convulsive movements involve the other side of the body more or less, and at length the tongue, so that the speech is interrupted, unequal, and imperfect. It is very possible that some cases of stammering may in fact be a local species of chorea, and also those cases of incessant winking or twitching of the nose or mouth, which we meet occasionally, and which are so difficult to cure, although they often get well. I have had under my care a little boy, very nervous, but healthy, who ordinarily winks about twice as often as other children, but if it be noticed, or if he be unusually earnest about anything, the eyelids are in incessant motion, and closed with unusual force. Stiebel has noticed this winking, as a modification of chorea, and he mentions also sneezing, rolling of the eyes, and a curious affection of the organs of speech, so that on awaking, the patient kept continually uttering a peculiar cry. Occasionally the hearing is affected, the child fancying that it constantly heard certain sounds. These local attacks may exist singly or along with the more general affection.

The expression of the countenance undergoes a remarkable change; in action it borders upon the ludicrous, but in repose it is almost idiotic. All the voluntary movements are distorted or impeded; control and direction are all but impossible, as Sydenham observes: "Before a child who hath this disorder can get a glass or a cup to wet his mouth, he useth abundance of odd gestures; for he does not bring it in a straight line thereto, but, his hand being drawn sideways by the spasm, he moves it backwards and forwards, till at length, the glass accidentally coming nearer his lips, he throws the liquor hastily into his mouth, and swallows it greedily, as if he meant to divert the spectators."*

The movements of the lower extremities are generally less violent than those of the upper, but sufficiently so to render the walk uncertain, irregular, and jerking, obliging the child in some cases to keep constantly moving in order to avoid falling, and rendering him at all times insecure and liable to fall. There is more agitation of the lower limbs in bed than when up, evidently because the weight of the body steadies them in the latter case.

The muscles which support the head are also affected, so that it is sometimes bent forwards or backwards, or jerked towards one or other shoulder, or agitated with a rotatory movement. When the attack is very severe, the muscles of the trunk participate, and the body is jerked hither and thither so violently as to render confinement to bed necessary. Rufz mentions a case in which the child threw itself out of bed, and crawled about the room like a worm.† Mr. Watt has

* Sydenham's Works, by Wallis, vol. ii. p. 430.

† Archives Gén. de Méd., 1834, vol. iv. p. 239.

related a case, in the *Medico-Chirurgical Transactions*, of a little girl who was seized with an irresistible propensity to turn round on her feet like a top, then to lie down and roll rapidly backwards and forwards; in a more advanced stage of the disease, while lying on her back, to bend herself up like a bow, by drawing her head and heels together, and then suddenly to separate them, so as to cause the buttocks to fall with considerable force upon the bed, and to repeat this continually for hours: at a still later period she was seized with a propensity to stand upon her head, with her feet perpendicularly upwards; as soon as her feet gained the perpendicular, all muscular action ceased, and her body fell as if dead, her knees first striking the bed, and her buttocks striking her heels; this was no sooner done than she instantly mounted up as before, and continued these evolutions, sometimes for fifteen hours successively, at the rate of from twelve to fifteen times in the minute. In mild cases of chorea, the irregular movements cease during sleep; but, when the attack is very severe, they do not cease entirely.

So far, we have seen the convulsive motions affect chiefly the voluntary muscles; but the muscles of organic life do not altogether escape. The rapid deglutition, the gulping down of fluids, is doubtless, owing to a spasm of the pharyngeal muscles; and the peculiar cry, which some emit, to spasmodic action of the larynx.

The general health may not be so much affected as we might expect, in simple chorea. The stomach seems capable of digesting food; the appetite, though occasionally capricious, is generally good, and now and then enormous. The bowels are most commonly regular and under control, although Berndt and Frank mention that they are occasionally moved involuntarily during a paroxysm. Dr. Copland states that the bowels are always constipated, and the abdomen somewhat hard and tumefied. There is no febrile action when the disease is uncomplicated; the pulse is rarely quickened, the skin is cool, and there is no increase of thirst. Pain is seldom complained of, and but little general distress. Out of twenty cases related by M. Dufosse, eight suffered from slight headache, six from palpitations, and two from a pain, increased by pressure upon the spinous processes. M. Richard states that most of the girls he has seen affected with chorea presented a lateral curvature of the spine; and he seems inclined to attribute it to an overstretching of the nerves. Out of more than one hundred cases, M. Stiebel did not find one where there was not spinal irritation evinced by tenderness in one or more vertebrae.

The temper of children laboring under chorea is very unequal; they are apt to be capricious, fretful, and easily frightened. Even a slight contradiction will bring on a paroxysm. In the majority of cases, when the attack is not prolonged, the intellect is scarcely affected; but if the disease be permanent, the mental power becomes weakened, or exercised fitfully and fancifully, and at length the patient becomes melancholy

and silent. M. Gardien denies that it ever ends in idiocy; but M. Rufz has related two cases in which it did; and certainly the appearance of some chronic cases gives one the impression of their being very little removed from that condition. It is possible that in these extreme cases the imbecility may be owing to some organic change in the brain, as we also occasionally find the patient attacked by epilepsy or hemiplegia; and Condie mentions that they are sometimes carried off by tubercular meningitis;* but this can only be considered as a secondary disease.

In the great majority of cases, chorea in children is an acute disease, increasing up to a certain point, then perhaps remaining stationary for a time, and at length gradually subsiding. Its duration varies from two or three weeks to several months. The quickest recovery Dr. Copland has ever known was eleven days; M. Legendre's patient died in nine days. M. Rufz fixes the mean duration at thirty-one days, M. Dufosse at fifty-seven days; and Rilliet and Barthez state the duration to range from six weeks to two months and a half. The latter careful observers saw but two cases that became chronic. Relapses, however, are very frequent. Dr. Copland saw it occur three times in the same patient, M. Rufz six times, and Rilliet and Barthez once, twice, and thrice in nineteen cases.

Chorea most frequently *terminates* in a return to health, with a considerable increase in stature generally; but it may also end in convulsions, epilepsy, palsy, anæmia, dropsy, hydrocephalus, or idiocy; and any of these attacks may prove fatal. Dr. Brown mentions three cases terminating in convulsions, coma, and death; and Dr. Elliotson one which proved fatal from apoplexy.

Complications.—The complications of any disease, or those secondary affections which arise in its course, are always of importance, and deserve most careful investigation, particularly in the diseases of children; for they are often masked by the primary disease, and yet are occasionally the more fatal. On this account, I shall endeavour to lay before my readers these secondary attacks as accurately as I can, without deciding whether they are mere accidental complications, or, as in many cases, I believe, have a positive relation and dependence upon the primary morbid condition.

Chorea is not unfrequently combined with hysteria, when it sets in at or soon after the eruption of the catamenia; nay, it may assume very much the appearance of the latter; and there will also generally be found some irregularity in the menstruation: it is either scanty, light-colored, irregular, or altogether absent. "The following procession of morbid phenomena is not uncommon," says Dr. Copland. "Chorea, with defective action of the digestive, assimilating, and secreting func-

* Diseases of Children, p. 455.

tions, and torpor of the liver; at a subsequent term, protracted catamenia, or scanty and protracted appearance of the secretion, occasionally with various hysterical affections, seldom amounting to a complete fit of hysteria; and lastly, when the catamenia become established, the hysterical affection is sometimes more fully pronounced, and with the regular establishment of the uterine functions the chorea disappears.”*

Dr. Copland was the first to demonstrate by post-mortem examination its complication with rheumatism, rheumatic pericarditis, and disease of the membranes of the spine, and his observations have since been confirmed by Drs. Pritchard, Roeser and Nairne,† Trousseau, Begbie,‡ Kirkes,§ &c.

Congestion of the brain, inflammation of its membranes, with serous effusion, tubercular meningitis, &c., have been detected by Sæmmering, Browne, Coxe, Patterson, Serres, Condie, &c. It is not uncommon to have some of the febrile diseases of infancy, as measles or scarlatina, concurrently with chorea; and some difference of opinion exists as to their influence upon the original affection. M. Rufz says that they exercise no influence upon either the duration or intensity of the chorea. On the other hand, Rilliet and Barthez state, that out of nineteen cases, nine were attacked by other diseases, and eight were evidently influenced by them; sometimes the chorea diminished from the commencement; in others it increased at first, and afterwards disappeared. They cite four cases from Legendre, Piet, and Rufz, in which measles, scarlatina, and smallpox occurred, and the chorea was cured.||

Pathology—The *post-mortem* appearances which are recorded result from the complications or secondary affections, rather than from the primary disease. The body is generally emaciated, the muscles flaccid and pale, and occasionally we meet with lesion of the stomach and bowels, or slight effusion into the peritoneum. Dr. Hawkins found increased vascularity of the uterus, tubercles in the lungs, and earthy concretions in the esentery, mœmentum, and pancreas; Drs. Copland, Pritchard, and Roeser, adhesion of the opposite surfaces of the pericardium, with effusion of serum. In one case Dr. Pritchard observed the surface of the heart covered in parts with coagulable lymph, its cavities much enlarged, and their parietes thin, pale, and flabby. Dr. John Ware has related a case in which, after the pericarditis had lasted some little time, symptoms of chorea displayed themselves forty-eight hours before death.¶

* Dictionary of Medicine, p. 328.

† Lond. Journal of Med., January, 1851, p. 91.

‡ Ed. Monthly Journal, Jan., 1852, p. 363.

§ Med. Gazette, 1850.

|| Mal. des Enfants, vol. ii. p. 303.

¶ Amer. Journ. of Med. Science, April, 1850.

Sœmmering, Brown, Coxe, Willan, Patterson, Guersent, and others, have detected marks of inflammation of the membranes of the brain, or of the brain itself, and also some foreign deposits in its substance or on its surface. In three cases M. Serres found inflammation of the tubercula quadrigemina, and in one a tumor resting on this part of the brain. MM. Monod and Hatin observed hypertrophy and vascularity of the brain and spinal cord, especially of the cortical substance; Bright, turgescence of the brain and cord, with bony lamellæ on the pia mater of the spinal marrow; and Kein, ecchymosis of the membranes, with a pulpy state of the medulla. Dr. Copland remarks: "In a case which occurred to me in 1819, complicated, or rather alternating, with rheumatism, with metastasis of this disease to the heart and subsequently to the membranes of the spinal cord, inflammatory appearances, with coagulable lymph and an effusion of turbid serum, were found through nearly the whole extent of their membranes; the patient having died in a state of universal paralysis." "Dr. Aliprandi has also detailed a case, in which morbid appearances similar to those described by myself and Dr. Pritchard were found in the spinal canal."*

MM. Rilliet and Barthez observe that in the great majority of cases no lesion of the cerebro-spinal system can be detected, their observations so far agreeing with those of Black, Rufz, Gerhard and Gendrin, &c. They mention some cases, however, in which there was great congestion of the membranes of the brain and spinal marrow, and one in which the latter was slightly softened,† as in two cases of M. Gendrin, one of M. Courtois, and three or four of M. Rufz.‡ Mr. Coley has also recorded the appearance of medullary meningitis with softening.§ Dr. Nairne has recently stated that he had seen four cases in which softening of the spinal marrow had been found in conjunction with chorea, but he did not think that the softening was the cause of the chorea.

M. See has published a very valuable memoir upon this subject. He found 34 patients affected with serous inflammation (of the arachnoid, pleura, or pericardium) out of 84 cases, 22 in which there was an alteration of the nervous substance, 10 in which there was hypersecretion of the meninges, and 16 in which no change of any kind could be detected. In a great majority, rheumatism of external parts was the primary affection, then disease of the nervous system, and lastly internal rheumatism.||

The opinions as to the nature of chorea, founded upon *post-mortem* examinations, are necessarily very various. They who have detected

* Dict. of Pract. Med., p. 329.

† Mal. des Enfants, vol. ii. p. 314.

‡ Barrier, Mal. de l'Enfance, vol. ii. p. 434.

§ Diseases of Children, p. 447.

|| Memoirs de l'Acad. de Medicine, vol. xv. p. 373.

no morbid traces will regard it, with Sydenham and many others, as a nervous affection analogous to convulsions; those who have observed morbid alterations will determine the seat and nature of the disease accordingly. So Bouteille, Clutterbuck, Lisfranc, &c., consider it to be inflammation of the cerebro-spinal axis; Serres, as an affection of the corpora quadrigemina; Bouillaud and Magendie, of the cerebellum, &c. But we must carefully guard against the error of mistaking complicated forms of the disease for essential examples of it, and of generalizing from too small a number of cases. There can be no doubt that this, as well as other nervous diseases, may be either idiopathic or symptomatic: in the former, little or no organic changes will be discovered; in the latter merely those of the exciting cause.

Dr. Marshall Hall observes* that "chorea is distinctly an affection of the true spinal system; it affords an example of the want of harmony between the cerebral and the true spinal acts; *volition* is normal; the true spinal action is abnormal. The *action* is abnormal or irregular, for want of a precise harmony between the two." Probably the explanation given by Copland is as correct as any; he states that "the proximate cause of chorea, in its true and simple form, seems to consist of debility, with some degree of irritation of the organic or ganglial class of nerves, extended more or less to those of volition, and occasioning morbid susceptibility of the nervous system generally, with diminished power, increased mobility, and irregular actions of the muscular system, particularly of those muscles supplied with the nerves principally affected. Whilst this appears to be the pathological state of the majority of cases of chorea, yet instances not unfrequently occur, in which the disorder evidently commences in the spinal cord or its membranes, disturbing the functions of the nerves issuing from the affected part."†

Causes.—Among the predisposing causes it would appear that sex has much influence, as we find the proportion of those attacked to be about three females to one male. In 240 cases M. Dufosse found seventy-nine male and 161 female children; and Dr. Stewart states that in 174 reported cases, there were 122 girls and 52 boys.

The age most obnoxious to attacks of chorea is from six to fifteen years, and on this account it has been regarded as essentially connected with puberty; but this cannot be correct, for M. Constant saw a case of the disease at the age of four months, and M. Dufosse one aged three years. M. Rufz gives a record of 189 cases: of these, ten were six years old, or under, and 179 from six to fifteen years of age. No doubt, as has been observed, this is a loose calculation, based upon hospital registries, which are not proverbial for their accuracy. Barthez and Rilliet mention nineteen cases: in three the

* Diseases and Derangements of the Nervous System, p. 195.

† Dict. of Pract Med., p. 331.

first attack occurred at four years of age; in one, at five; in one at six; in two, at seven; in two, at eight; in four, at nine; in one, at ten; in two, at eleven; in one, at thirteen and a half; and in two, at fourteen years of age.

I have already mentioned cases occurring at an advanced period, so that we cannot attribute as exclusive an influence to a certain age as some writers; but on the other hand, it cannot be denied that puberty may, and probably does, exert considerable influence.

What effect climate may have is not very easy to determine; the disease appears to occur less frequently in southern countries, and in the West Indies is altogether unknown.* Children of a nervous temperament, of great sensibility, and precocious intellect and passions, are generally considered to be more liable to chorea than others; but this is doubted by Elliotson, Ruz, Rilliet and Barthez. It is certainly not confined to delicate children, for many of those attacked by it have previously enjoyed excellent health. It may be doubtful whether we ought to consider chorea as an hereditary disease, although Coste, Young, and Constant, have each met an example, and Stiebel has known families in which every child was attacked at a certain age.

According to some authors, *e. g.*, Mezerai, Cullen, and Hecker, chorea has occurred epidemically. Albers, cited by Frank, mentions a school in which it appeared as an epidemic, and Rilliet and Barthez a village in the Tyrol in which it occurred recently. Dr. Copland has given an interesting section on nervous disorders resembling chorea; as the effect of the bite of the tarantula, the leaping ague of Scotland, and an affection which spread rapidly among a sect of religious enthusiasts in Tennessee and Kentucky, described by Dr. Robertson, &c. &c., which strikingly resemble chorea, and the extensive prevalence of which may have originated the idea of an epidemic. Dr. Wicke† states, that in a boarding-school at Eisenach the disease spread by imitation; and it must be remembered that no disease is more likely to be imitated, and no class of persons more likely to become imitators, than those who are the fittest subjects for chorea.

Among the *exciting* causes are enumerated worms, dentition, fright, falls or blows, according to Reeves, Bedingfield, Hall, Ecker, Rilliet and Barthez, &c. Copland, Ploucquet, and Pritchard, attribute it to rheumatic metastasis to the membranes of the spinal cord; Darwin, Haygarth, and Richter, to mental exercise, emotions, or passions.

Diagnosis.—The pathognomonic characters of chorea are, permanent, chronic, and, to a certain extent, voluntary movements, irregular in direction and amount; their cessation during sleep; the consciousness and sensibility of the patient; and the age at which, and

* Stewart on Diseases of Children, p. 495.

† Analekten der Kinderkrankheiten, Part viii. p. 89.

the mode in which, the disease commences. It is just possible that chorea may be confounded with hysteria, convulsions, paralysis, and delirium tremens.

1. From the similarity of the age at which *hysteria* makes its first appearance, there may be some difficulty in the diagnosis of these diseases about the period of puberty, and especially at the commencement of a first attack, but none at an earlier age, for then hysteria is unknown. Moreover, as Dr. Copland has observed, chorea is often combined with hysteria in girls, and then, of course, distinction is impossible. But generally, hysteria occurs in more distinct periodic paroxysms, the movements less contorted, less ludicrous, quite involuntary, and generally accompanied with globus hystericus, laughing and crying, and pale urine.

2. In *convulsions* the movements are spasmodic, entirely involuntary, and much more violent, whereas the movements in chorea, though partly involuntary, are, to a certain extent, under the control of the will, and are in general modifications of voluntary motions. Further, in convulsions, the patient is, for the most part, unconscious and insensible.

3. When chorea is confined to one portion of the body, for instance, the tongue, on account of the difficulty of articulation, and the irregular protrusion of that organ, we may be led to suspect *cerebral disease*, but the speedy extension of the chorea will rectify our opinion; and when more of the body is affected, the preservation of sensibility, and, to a considerable extent, of motion, voluntary and involuntary, will preclude the possibility of supposing the case to be *paralysis*.

4. The age at which chorea occurs, so far, at least, as concerns my present subject, precludes, of course, the suspicion of *delirium tremens*.

Prognosis.—The prognosis will mainly depend upon whether the chorea be simple or complicated, idiopathic or symptomatic. In the majority of simple cases it is favorable, although Rufz and Rilliet and Barthez have recorded two cases which terminated fatally.

But when it is complicated with rheumatism, inflammation of the membranes of the brain or spinal marrow, convulsions, dropsical effusions, &c., the prognosis will be much more serious, and will depend, in a great measure, upon the extent and severity of the secondary affections, and upon the constitution of the child. Many fatal cases are upon record, although the majority recover. According to Joseph Frank, chorea neglected, may lead to mania, apoplexy, paralysis, and consumption.

Treatment.—The list of remedies which have been tried in this disease is long and varied, as the reader may see by referring to Copland's Dictionary.

The indications of treatment must be founded on a careful study of each case, its characters, complications, &c. The first indication in simple chorea will be to remove fæcal accumulations, and to correct

any morbid condition of the intestinal canal; the second, to relieve nervous affections; and the third, to subdue the complications, if there be any.

By many authors, purgatives alone are recommended, but, as Dr. Copland observes, a combination of purgatives with antispasmodic or stimulating remedies is much more efficacious. A full dose of calomel may be given at first, followed, at intervals, by infusion of gentian and senna, or by an occasional dose of castor oil and turpentine. The frequency and continuance of the purgatives will be decided, in a great measure, by the character of the evacuations. But although we have abundant evidence of the success of this plan in this country, I ought not to omit to state that in France, according to Rilliet and Barthez, little or no confidence is felt in purgatives. Breschet recommends tartar emetic in full doses, but given so as not to excite vomiting.

For the relief of the nervous affection, antispasmodics, narcotics, and tonics, are recommended. Valerian was first employed by Bouteille, and since by Murray, Guersent, and Jadelot, with success; assafoetida has also been found useful. Oxide of zinc, gr. iij. to gr. v. three times a-day, originally given as a quack medicine in this disease, has been employed by Duncan, Fouquet, La Roche, Wright, &c. Should it irritate the stomach, the addition of gr. ij. of the cuprum ammoniatum will correct it, as Dr. Odier, of Geneva, has observed. Drs. Copland and Babington consider the sulphate of zinc very useful, beginning with small doses, and increasing up to twelve or fifteen grains, three times a-day, according to the latter physician.

Frank, Uwins, and Crampton, have tried nitrate of silver, after purgatives, with great benefit in obstinate cases. Camphor has been recommended by Worlhoff, Mahon, &c. Other practitioners have given, successfully, Fowler's solution of arsenic, iodine, stramonium, prussic acid, belladonna, opium, &c. As, however, to be of any use, antispasmodics must be continued long, it will be well, after free purgation, to try those first which will admit of continuance, as valerian, assafoetida, oxide or sulphate of zinc, &c., and in combination with some tonic, as in the following formula, given by Dr. Copland:—

R.—Pulv. calumbæ, gr. x.
 „ valerianæ, gr. xij ad ʒj.
 Carb. ferri pp. gr. x.
 Pulv. cinnam. gr. vj.—M.

Ft. pulv. vel elect. mollo cum. syr. zinzib. q. s. Bis vel ter. quotid. sumatur.

As a tonic, bark or quinine will be found most generally useful, and it may be given in the form of powder or decoction, or as a pill. Marley recommends bark or calumba, with decoction of aloes, after a full dose of calomel and jalap, followed by moderate laxatives.

Mead, Elliotson, Bateman, Baudelocque, and Bonneau, have obtained

great success from preparations of iron; Elliotson and Baudelocque prefer the subcarbonate, and Bonneau iron filings, in combination with quinine and a small portion of opium; and to the efficacy of the latter remedy Rilliet and Barthez bear ample testimony.

Mr. Salter* has detailed successful cases treated by the liq. arsenicalis; and Dr. M. Hall has added a similar case of his own, and one of Dr. Heming's.

Drs. Peltz, Abney, and Baudelocque have lately tried iodine with great advantage.†

Recently very decided testimony has been presented by Young, of Pennsylvania; Lindsay, of Washington; Hildbreth, of Ohio; Kirkbride, and Professor Wood, of Philadelphia; and Bradle, of New York, in favor of the *cimicifuga* in cases of chorea. It may be given in doses of half a teaspoonful of the powdered root three times a-day; or from one to two drachms of the saturated tincture; or a wineglassful of the decoction.‡

Dr. Neumeister, of Arneburgh, has published some cases successfully treated by a combination of the *artemisia vulgaris* and *assafoetida*§ with a small quantity of the *ol. animale Dippelii* and *tinct. castorei*.

When the convulsive movements are violent, incessant, and prevent sleep, there can be no hesitation in administering narcotics; it is in such cases that opium, stramonium, hyosciamus, and belladonna have been recommended; but it will need a great watchfulness and caution if the latter be exhibited, especially with young children. I should myself much prefer opiates, as being more steady and certain in their effects, and less injurious.

Cold baths have been much used by Petit, Jadelot, Dupuytren, and Marley, and sea bathing by Hufeland and Himly: but I agree with Biett and Copland that a shower bath, the patient standing in warm water, is more likely to be beneficial. Baudelocque substituted sulphurous baths for simple water, and with good effects. They were easily prepared by adding sulphuret of potash to the ordinary bath, and were taken every day, the patient remaining in the bath half an hour or an hour. Five out of eight patients thus treated were rapidly cured, according to Rilliet and Barthez. M. Blache formerly regarded the methodical use of sulphur baths as the best remedy, but now he prefers gymnastic exercises. Thirty-four cases of moderate intensity, were cured in a mean period of 18 days; of 74 very severe cases 68 were cured in 42 days.||

* Med. Chir. Trans., vol. x.

† North American Med. Journal, vol. ii.

‡ Condie on Diseases of Children, fourth edition, p. 463.

§ Journal für Kinderkrankheiten, Jan. and Feb., 1851, p. 19.

|| Mem. de l'Acad. de Med. vol. xix.

Counter-irritants have been recommended ; blisters, setons, issues, and moxas have been tried ; but the result does not seem very encouraging.

Electricity, or electro-magnetism, has been advocated by De Haen, Fothergill, Schaeffer, &c., and found useful in some obstinate cases by Meyraux, Addison, Bird, and others. Dr. Bird is said to have cured twenty-nine out of thirty-six, and to have afforded relief in five of the remainder. The electricity was applied in the form of sparks, in the course of the spine, every other day, for about five minutes at a time, until an eruption appeared. When the electric shocks were transmitted through the affected limb, the convulsive movements were increased ; and, if employed when the patient was convalescent, they reproduced the disease.

Trousseau has treated thirteen cases of chorea with strychnine, ten of them with complete success. He employs the sulphate of strychnine dissolved in syrup, one grain to three ounces and a half ; of this, two drachms and a half are given daily in three doses ; and the quantity is every day increased a drachm and a quarter until itching of the scalp and slight muscular stiffness are observed. The cure is generally completed in one month.

Opinions differ very much as to the propriety of bloodletting ; and it is not improbable that the difference may have been owing to the presence or absence of complications which would materially affect the result. Sydenham recommends bleeding to eight ounces, then three or four purgatives on alternate days, after which, he repeated the bleeding and purging, with an opiate at night, and a sufficient interval between each evacuation to avoid all danger.* Cullen says that it is sometimes useful, in other cases injurious. Watt found it decidedly useful, Armstrong injurious ; but Clutterbuck, Bouteille, Serres, and Lisfranc, recommend it. Its propriety will depend upon the evidences of congestion or inflammation in the brain or spinal marrow, indicated by pain, increased vascular action, heat of the head, coldness of the extremities, &c. ; then a few leeches behind the ears or along the spine, or cupping, followed by cold affusion or irritating liniments, and warmth to the lower extremities, will be highly proper.

Believing the disease to result from pressure upon the spinal nerves, M. Stiebel rejects all the specific remedies, and applies leeches to the sensitive part of the spine, then mercurial ointment, counter-irritation, and, at a later period, cold shower baths. If this treatment do not relieve the complaint in two or three weeks, he suspends all remedies, and prescribes good diet, fresh air, &c.

Marley† mentions that two of his patients who had resisted the usual

* Works, vol. ii. p. 431.

† On Diseases of Children, p. 111.

remedies, recovered on the occurrence of menstruation; and this will always be a ground of hope with girls affected with chorea.

During the progress of treatment, the diet should be light and moderate, varying according to the constitution of the patient and the complication it presents. If there be evident inflammatory action, of course, low diet will be necessary; if, as it is sometimes the case, the patient be nearly in a state of anæmia, full diet will be required.

When convalescent, the patient will be greatly benefited by change of air, and scene, and by the use of mineral, aperient, or chalybeate waters, according to circumstances. Sea bathing, with a free admixture of amusement, exerts a salutary influence.

The *complications* will necessitate a change in the treatment. When rheumatism occurs, Dr. Copland observes, "it has generally been promoted by too lowering a treatment, but prevented by tonic and stimulating medicines, with due attention to the alvine evacuations. In cases, therefore, complicated with rheumatism, chlorosis, anæmia, or retention of the menses, the purgatives selected should be of a warm and stomachic kind, or combined with cordial and stimulating substances—the ammoniated tincture of guaiacum, camphor, serpentaria, and similar substances, being also employed. In these states of disease, the internal use of the cod or tusk-liver oil will be found most beneficial. Having observed instances in which the suppression of rheumatic affections of the joints, by the use of embrocations and liniments, was rapidly succeeded by the appearance of internal disease, the application of such remedies to the external seat of the rheumatic disorder should not be resorted to."*

When chorea occurs in girls after the age of puberty, and is complicated with hysteria and menstrual irregularity, it will be necessary, after evacuating the bowels, to attempt the regulation of the uterine functions by hip baths, emmenagogues, particularly preparations of iron, and perhaps by leeching the upper part of the thighs.

When chorea is complicated with inflammation of the membranes of the brain, or of the pericardium, as these are far more dangerous, their treatment will to a certain extent supersede that for chorea. Antiphlogistics generally, bleeding, or leeches, calomel, and counter-irritation, will be indispensably necessary, modified in degree by the state of the constitution of the child, by the stage of the disease, and by the co-existence of chorea. Great care, great watchfulness, and a nice tact in the adaptation of remedies, will be necessary. For the method of treatment, I will refer the reader to the chapters treating of those diseases.

* Dictionary of Medicine, p. 335.

CHAPTER V.

CONVULSIONS.

THERE are few diseases of infants and children which are more formidable or more fatal than convulsions. They attack children of all ages, of different natural constitutions, and under very various circumstances, "*sous toutes les latitudes, sous la zone brulante des tropiques, comme sous la zone glacée de Spitzberg.*"*

The disease has been variously classified, and with different meanings attached to the same nomenclature; the essential distinction, however, being between an attack dependent upon disease of the brain or spinal marrow, and those cases where no such disease exists. These constitute the idiopathic and symptomatic convulsions of authors. Dr. Marshall Hall has proposed a more scientific division into centric and eccentric: "The former class would comprise all diseases of the brain and spinal marrow, complicated with convulsions; the latter all those convulsive diseases which arise from teething, indigestion, deranged bowels, and which probably act through the fifth pair, the eighth pair, and the spinal nerves respectively, and constitute a part of a more comprehensive class of diseases, embracing affections of a series of nerves of what I have designated the reflex functions."†

I shall, however, adopt the more recent division into: 1, primary or essential convulsions, arising from irritation of various kinds, mental emotion, &c.; 2, sympathetic convulsions occurring in the course of fevers, or organic diseases of any kind, excepting those of the brain or spinal marrow; and 3, symptomatic convulsions, connected with diseases of the head or spine.

M. Bouchut has given forty-one cases of convulsions: twenty-seven were essential or sympathetic, and fourteen symptomatic. Of the twenty-seven, fifteen were attacked in perfect health, and were cured; but four of them died some months afterwards, of other diseases, and no structural alterations were detected in the brain: twelve occurred in the course of other complaints, as pneumonia, erysipelas, &c.; seven

* Brachet sur les Convulsions. 1824.

† Underwood on Diseases of Children, p. 268.

of these died, and in one only was there any morbid appearance in the brain. He concludes, therefore, that convulsions may occur, 1, in a state of health; 2, in the course of acute diseases, and in such cases as are analogous to delirium; and 3, that there is no relation between these convulsions and lesions of the nervous centres."*

MM. Rilliet and Barthez refer to twenty-five cases of sympathetic, and thirty-five cases of symptomatic convulsions; but this apparent disproportion is explained by their not including in their report infants under a year old, and we know that primary convulsions are greater in infants than in older children. They have given the following table of the ages at which the patients were attacked.

25 CASES OF SYMPATHETIC CONVULSIONS.				35 CASES OF SYMPTOMATIC CONVULSIONS.			
At 18 months old there occurred 1 case.				At 2 years old there occurred 6 cases.			
2 years	"	"	4 "	3 "	"	"	9 "
3 "	"	"	7 "	4 "	"	"	2 "
4 "	"	"	4 "	5 "	"	"	5 "
5 "	"	"	3 "	6 "	"	"	2 "
6 "	"	"	5 "	7 "	"	"	3 "
7 "	"	"	1 "	8 "	"	"	1 "
				9 "	"	"	3 "
				10 "	"	"	2 "
				11 "	"	"	2 "

Taken altogether, primary convulsions are by far the most frequent during early infancy, and symptomatic convulsions at a more advanced age.

Causes.—It has been stated that female children are more obnoxious to these attacks than males; but this is very doubtful. As far as my own experience goes, I should say the contrary, and this accords with the observations of MM. Rilliet and Barthez. Of their twenty-five cases, fifteen were boys, and ten girls. The opinion, probably, had its origin in the fact that nervous children seem especially predisposed to convulsions, but the distinction of sex as to temperament is not so decided in children as in adults.

It is not very clear whether climate exerts much influence upon the disease. Mr. North seems to think that it does, and he quotes Dr. Hillary, who observes that the children of the island of Barbadoes are so irritable that they are thrown into convulsions by the slightest noise;† but we find convulsions equally prevalent, I think, in temperate, or even in cold climates.

* Manuel Prat. des Mal. des Nouv. Nés et des Enfants à la Mammelle, p. 387.

† North on Convulsions, p. 15.

It certainly appears that convulsions may be hereditary and congenital. Boerhaave mentions that the children of an epileptic man all died of the same disease. Lorry relates the history of a family, of which the father, mother, and children were affected with convulsions from the slightest cause, notwithstanding that the children had been brought up separately, and educated differently. Baumes gives several similar cases. Guersent and Blache mention the case of a woman who was extremely passionate during pregnancy, and who lost three infants successively, from convulsions, soon after birth; and Bouchut states that he knew a family of ten children, all of whom had convulsions, during infancy; one of them married, and had ten children, nine of whom had convulsions, and six died.* Among Rilliet and Barthéz's cases two were children of an epileptic father, and a third had lost four brothers and sisters of convulsions.

Mr. North attributes the congenital predisposition to convulsions in many cases to feebleness of the parents; to their marrying at too early or too advanced an age.

If the mother, when pregnant, receive a great shock, a severe fright, or be subject to any other strong mental emotion, the child is often attacked by convulsions soon after birth. On the other hand, children born during an attack of puerperal convulsions are not necessarily affected by the disease. I have seen a considerable number of such cases, where the infant was saved, and I am not aware of a single case which was subsequently attacked.

The disease has occasionally prevailed as an epidemic; in Paris, as described by Gualtier de Claubry, and in Copenhagen, according to Lange, where it was very fatal.

The delicate condition of the brain, its transition from quiescence to organic activity at birth, and the concentration of stimulation from the senses and other organs, must naturally, one would think, predispose to the disease.

The influence of temperament must not be omitted; no doubt, nervous, sensitive, and irritable children are most liable to convulsions, and perhaps those of a full plethoric habit; but not these alone, for they not unfrequently attack infants in a state of anæmia, those, for instance, who have lost blood from the navel-string; or weak, pale, delicate children, and those exhausted from excessive discharges.

A large-sized head has been regarded as predisposing to convulsions by Desessart, Gardien,† and others, and popularly it is considered as a sure sign, especially if the forehead be prominent, and yet nothing can be less generally true. I have noticed many such cases, and have watched them carefully for many years, for the purpose of ascertaining the value of this opinion, and I have found it, as a rule, useless and

* *Mal. des Nouveaux Nés*, &c., p. 395.

† *Traité des Accouchemens*, &c., vol. iv., p. 250.

untrue. "Levret, Baumes, and other writers," says Mr. North, "affirm that it may be established as an axiom, that children born with large heads, or whose heads increase in size disproportionably to the other parts of their bodies, will have convulsions. In my own practice I have seen convulsions occur very frequently with children of small heads. In rickety children the size of the head is disproportionately large; and from the general symptoms of rachitis, it is evident that the head and spinal marrow are considerably affected: the brain increases rapidly in size, the senses are usually very acute, and convulsions are very frequent attendants of this distressing malady. It not unfrequently happens, that when some children of the same parents are affected with rachitis, others, who are exempt from this disease, are at a very early age destroyed by convulsions."

The *exciting* or occasional causes are very various. Shame, anger, and fright have been known to induce an attack. North relates a case of a child thrown into fatal convulsions by the nurse threatening to throw him out of the window if he did not cease crying. It has been attributed to tight bandaging, a pin piercing the child, excessive mental emotion, a loud noise, sudden exposure to a bright light, hot, impure air, or severe cold. Guersent and Blache mention their occurrence in children confined in a hot chamber, or in a crowded and hot theatre, for some hours; and Brachet states that a little girl, being exposed to a severe cold for eight or ten minutes, was seized with difficulty of breathing threatening suffocation, followed by convulsions.

During the first year of life, convulsions may not unfrequently be traced to the milk of the mother or nurse disagreeing with the infant, or having been disordered temporarily by fright, passion, or suffering. Sæmmering mentions a curious case of a woman whose milk agreed with her own child, but caused convulsions in all others. M. Guersent relates an instance of a woman deserted by her husband, and in her distress her infant had an attack each time it took the breast. Dr. Underwood mentions a mother who nursed her child immediately after witnessing a sudden death; the child was attacked by convulsions, after which it remained comatose for thirty-six hours, but ultimately recovered. Numerous cases are on record of convulsions supervening upon violent passion in the nurse. I have witnessed more than one case resulting from the mother suckling her child during a time of severe affliction and distress.

It is said that the exhibition of soothing medicine by the nurse, such as Godfrey's cordial, syrup of poppies, &c., may bring on an attack.

At a later period dentition is certainly a very frequent cause; the distension of the gums, the pressure, the intense congestion, occasion so much irritation, that an attack of convulsions is a common result. This is the case particularly with lively, sensitive, nervous children, although the more quiet and phlegmatic do not always escape. I have repeatedly observed in these cases a sort of gradation from

simple irritation and restlessness to starting, surprise, wildness of look, partial or local convulsive movements, and lastly, general convulsions.

Or the attack may be caused by derangement of the stomach and bowels, from retention of the meconium or urine, from too much or too thick food, from eating indigestible matters, the improper use of stimulants, &c.; or it may arise from the diarrhœa consequent upon these errors of diet. One of my own children was attacked by severe diarrhœa, followed by reaction, high fever, and convulsions. It was remarked to me by Dr. Charles Johnson, one of the most accurate observers and judicious practitioners I have ever known, that such cases are generally more manageable than others, and so I have found it. I have also known them result from renal disturbance.

By many authors an attack has been attributed to worms, and Brachet relates a case of convulsions which was owing to a worm in the meatus auditorius. Cerise and Barrier admit the influence of suppressed normal or morbid secretions or eruptions in the production of convulsion, although the latter thinks that it has been exaggerated. Certain it is that an eruption of *crusta lactea* on the head has been repeatedly found to cure the disease.

Too long continued or too long suspended exercise of the senses may equally give rise to convulsions in infants, and too much mental excitement and exertion in children of more advanced age. The attempt to push forward the education of children is, in fact, an excess of stimulation to the brain, and is attended with the greatest risk.

So much for the cause of *primary* convulsions. *Sympathetic* convulsions frequently usher in organic diseases, or eruptive fevers, as scarlatina, measles, &c.; and Sydenham and Bouchut are rather disposed to regard it as a favorable occurrence. It is remarkable, however, that in these cases we have one or two convulsions only, scarcely ever a frequent repetition of them, and this I think will enable us to distinguish the convulsions ushering in an eruptive fever from others. Barrier mentions three cases of pneumonia, commencing in this manner, and the fact is noticed by many writers.

Or they may occur in the course of organic diseases of the chest or abdomen, particularly towards their termination, from their amount of irritation, or from exhaustion. The latter attacks are analogous to the convulsions from anæmia. Mauthner remarks: "I have often observed, in cases of extensive hepatization or tuberculization of the lungs, during the course of which the brain was perfectly unaffected, that the children, a few days before death, lost all chest symptoms; that the cough and orthopnœa seemed to have entirely vanished, their appetite returned, and they seemed cheerful; when convulsions suddenly came on, followed, in a few hours, by death."*

* British and Foreign Review, No. 42, April, 1846, p. 392.

Dr. Simpson has suggested that albuminuria may occasionally give rise to convulsions, and he mentions a case of convulsions in an infant on the third day after birth in whose urine he detected albumen.*

From the mechanical interruption to the regular cerebral circulation, it is not uncommon to have convulsions in the course of croup or whooping-cough, nor do I know a more unfavorable complication; the child is generally not in a condition to bear active treatment, and even if we succeed in allaying the convulsive attack for the time, it is almost certain to return if the cough continue.

Convulsions may occur at the termination of any of the organic diseases, and in such cases the result is generally unfavorable whether the sympathetic irritation be of an active kind or result from exhaustion—"à repletionne aut ab evacuatione"—according to Hippocrates.

Symptomatic convulsions may result from various cerebro-spinal diseases; congestion and inflammation of the membranes; effusion of fluid; inflammation and softening of the brain or cord; abscesses, tumors, or spiculæ of bone making undue pressure upon any part, &c. &c. We shall enter more fully upon this question by and by when treating of these diseases.

As to the *proximate cause* or *pathological* condition of the nervous system in convulsions, some confusion has arisen from the distinction between primary, sympathetic, and symptomatic convulsions not having been always observed. In the former classes very little information is obtained by a *post-mortem* examination, the knife of the anatomist being inadequate to the detection of functional derangements, or of disturbances, however serious, which result from irritation only. In the majority of cases of primary or sympathetic convulsions, no change can be discovered in the brain or spinal marrow, or in their membranes; in others there may be a degree of congestion or vascularity, but whether this precedes or follows the attack of convulsion is not quite clear. In some cases the brain exhibits an anæmic condition.

In *symptomatic* convulsions we shall find the traces of the primary disease of the nervous centres: Inflammation of the membranes of the brain, sharp spiculæ of bony matter formed in the dura mater, abscesses in the brain, or effusion of blood into its substance from external violence, are the appearances recorded by some of the older physicians. Effusion of serum, vascular turgescence, tumors attached to the membranes, or imbedded within the substance of the brain, are noticed by more recent writers. Turgescence of the vessels, a deep red color of the dura and pia mater, and effusion of blood beneath the cranium, are the appearances described by De Claubry. Vascular turgescence at the origin of the nerves distributed to the muscles that had been affected with convulsive movements, has been noticed by

* Edin. Monthly Journal, Oct. 1852, p. 374.

Moulson. Effusion of serum, or of a gelatinous matter, engorgement of the blood-vessels, extravasation of blood, abscesses, tumors, and inflammation of the meninges of the brain, are the lesions described by others. Effusion of blood within the spinal canal, engorgement of the vessels of the brain, and extreme venous congestion of the entire substance of the brain, with serous effusion, were met with by Horner in one case, and the same appearances, with extreme mollescence of the brain, in another. Turgescence of the vessels of the brain, its substance of a pink color, with serous effusion into the ventricles at the base of the cranium and within the theca of the spine, are noticed by Kennedy. Dr. Condie states "that in every instance in which we have examined the brain, after death from convulsions, more or less disease of that organ, or of the medulla oblongata or spinalis, was present. In most cases this amounted to simple but very extensive hyperæmia, with slight effusion of serum beneath the membranes, or within the ventricles; in other cases partial softening of the brain was very evident; tubercles were frequently detected, either meningeal or within the substance of the brain; and in a few cases of effusion of blood upon the surface of the brain, at its basis, or within the theca of the spinal marrow."*

Symptoms.—The mode of invasion varies a good deal in *primary* convulsions. In the majority of cases the infant is dull, heavy, and feverish, for a day or two previously, or it may be restless and irritable with an uncertain oscillation of its eyes, or an occasional wide stare; grinding its teeth, starting in its sleep, or awaking in a fright; disordered and irregular respiration; loss of appetite; thirst, and spasmodic turning in of the thumbs, and bending of the wrists, or ankle-joints, as described by Dr. Kellie.

In other cases there are no precursory symptoms; the child is attacked when perfectly well, occasionally in his sleep; or suddenly in the course of other diseases, with no circumstances which would lead us to anticipate convulsions.

When first seized, the child has a bewildered, surprised, frightened look; its eye expresses terror; the globe is agitated with irregular jerking movements. Sometimes the pupil is turned upwards, sometimes, downwards; then, perhaps, it is for a moment steady, until drawn to one side or the other; the parallelism of the two eyes is lost, and the child squints horribly; sometimes the pupil is contracted, in other cases it is dilated; and frequently, from the turning upward being excessive, the iris is invisible, giving a frightful expression to the face.

"The effect of light upon both pupils is not always similar; one may remain fully dilated, while the other contracts; or one pupil may remain stationary, the other being alternately contracted and dilated. I am not aware that the remark has been made before,

* Condie on Diseases of Children, p. 400.

but I believe, from frequent observation, that when a light is applied close to the eyes, and the same effect is not produced upon both pupils, that we have much reason to fear some serious affection of the head."*

The muscles of the face are thrown into irregular and distorted action; the mouth, cheeks, &c., are twitching and jerking in different directions; sometimes the jaws are forcibly closed, or only moved laterally, so as to grind the teeth. The child froths at the mouth, and the respiration has a short, broken, and hissing sound.

If the attack be very slight, the convulsive movements may be limited, or nearly so, to the face, but in general the trunk and extremities speedily become involved. The head is thrown strongly backwards, or to one side, or it is rapidly rotated from side to side; the muscles of the back are rigid, or act with sudden and irregular jerks; the arms are demiflexed, and thrown about irregularly; the hands are clenched, with the thumbs turned into the palm, and twisted or forcibly flexed or rotated. The lower extremities are similarly affected, but more slightly, and the feet are generally flexed upwards and inwards.

I have already stated that the respiration is quick, broken, and sibilant, from the quantity of mucus in the mouth. Occasionally it is very irregular, a series of rapid breathings being followed by a long rest, then a deep inspiration, and immediately after, the rapid respiration. This may be partly owing to disordered innervation, and partly to muscular disturbance. The pulse is accelerated, ranging from 110 to 140 or 160, generally small and hard, and often irregular. The action of the heart is disturbed, the rhythm and force of its contractions being frequently modified. The face becomes florid, sometimes violet; the head is hot, the feet cold, and a clammy moisture soon breaks out over the body, but particularly upon the head and face. Intelligence is wholly, and sensation partially suspended; the child recognizes no one, in most cases it does not see at all; a loud noise or a brilliant light produces no effect, but the sense of touch, though impaired, is not lost. If the attack be violent, the internal muscles share in the disorder, and the urine and fæces are evacuated unconsciously.

The duration of the fit varies very much, lasting but a few seconds in some cases, in others from five minutes to ten or twelve hours.

At length the convulsive movements relax, and ultimately cease, and the child falls into a state of general relaxation; the face becomes pale, the eyelids closed, the limbs flaccid, the respiration quiet and regular, the pulse slower and weak, and sleep supervenes. From this sleep the infant awakes feeble and exhausted, but generally conscious and intelligent.

Variations.—The above is an imperfect sketch of an ordinary con-

* North on Convulsions, p. 70

vulsion; it would be almost impossible to describe the multiplicity of combinations, and the endless variations we meet with in practice. Some of the more ordinary deviations, however, I must notice. I have already mentioned that in many cases there are no premonitory symptoms; this is the case with primary convulsions, and also with sympathetic; in the latter there will be present the symptoms of the organic disease, but the fit may supervene quite unexpectedly, whether at the beginning or the end. When it ushers in the eruptive fevers, the child will show more or less evidences of fever, and, perhaps, but not always, some evidence of the head being involved. In symptomatic convulsions there will generally be ground for anticipating a fit, although it may occur suddenly.

Again, the convulsion may be much lighter than the one I have described, consisting of momentary unconsciousness, with sudden involuntary movements, something like a violent rigor; or even less marked, the body becoming rigid, the eyes fixed and staring, the hands clenched, and almost immediately a return to the natural state. I remember a case in which measles was ushered in by a fit as slight as this, but was accompanied or followed by an optical delusion, the child fancying that he saw dogs jumping on the bed: the fit did not return, but the vision of dogs recurred occasionally for some time.

In other cases the convulsion is partial; one part of the body only being affected, sometimes one-half; in other cases the face only, or the eye, or a more distant set of muscles; and these local or partial attacks are apt to lead the young practitioner to undervalue the disorder, and to treat the case feebly and inefficiently.

Ordinarily the fit terminates in sleep, and on waking the child is heavy and exhausted; occasionally there remains some weakness of one or both limbs, with a peculiar expression about the eyes.

In some cases it is cut short by what appears to be a critical evacuation, as in the cases related by Planque,* Condie,† and others, in which hemorrhage occurred from the mouth, nose and ears; by diarrhœa, according to Whytt,‡ Jacques,§ &c.; or by vomiting or epistaxis, according to MM. Brachet and Bouchut.

In primary and sympathetic convulsions, the first attack is sometimes, though not always, the only one, but in symptomatic convulsions there are generally several. The interval between them varies from half an hour to a day or two; the symptoms of each fit are the same, and the termination similar, unless they prove fatal. Rilliet and Barthez remark that the duration of each fit is longer, and the severity greater, in symptomatic than in sympathetic convulsions, and that they occur more frequently in the night.

* Bibliothèque Méd., vol. iii. p. 504.

† Diseases of Children, p. 400.

‡ On Nervous Diseases.

§ Journ. Gén. de Méd., vol. xxix. p. 280.

Under proper treatment, a good proportion of cases of primary convulsions recover; the fits either do not return, or they become weaker, the intervals longer, and then cease altogether, and the child gradually recovers its health. In some of the most successful of such cases, I have seen, however, two consequences of the attack, which remain for a considerable time; one is an obliquity of vision, not perhaps, amounting to a squint; and the other a degree of insecurity in walking or running, so that a very slight obstruction will occasion the child to fall. More serious effects, however, are not uncommon; Brachet mentions, as a consequence of convulsions, pains in the limbs, ecchymosis, rupture of the tendons, luxations, fractures, and curvature of the bones.*

Bouchut states that he has seen wry neck, drooping eyelid, squinting, distortion of the mouth, and contraction of some of the limbs;† but in sixty cases Rilliet and Barthéz did not find a single case of this kind.

Dr. John Clarke mentions the occurrence of paralysis after one or two convulsions,‡ from which, after some time, the child may partially or wholly recover; and Dr. Hamilton, chronic epilepsy, chorea, idiocy, imbecility.§

Or an attack of convulsions may localize itself, as it were, and become partial; thus I have seen spasm of the glottis supersede general convulsions, by which it was preceded and complicated.

Mr. Thompson, of Whitehaven, has recorded a case in which loss of hearing and speech occurred after a fit of convulsions, and were not recovered for many years.

Children who recover from convulsions are very liable to a relapse from even a slighter degree of the same causes, or from others of less severity, but this susceptibility ceases in a few years.

When convulsions occur at the commencement of eruptive or ordinary infantile fever, the child may run through them very safely notwithstanding. Hippocrates observes that convulsions followed by fever terminate happily.

Sympathetic convulsions occurring in the course or towards the end of other organic diseases, are a serious addition to the danger; the former may subside, but the latter generally terminate the disease fatally. The frequency of this occurrence will explain the disproportionate amount of cases of convulsions in the list of mortality.

In some cases the attack has terminated in a state (probably of partial asphyxia) which has been mistaken for death. Brachet mentions a child which recovered after having been abandoned as dead. Mr. North

* *Traité des Convulsions*, p. 46.

† *Mal. des Enfants*, p. 400.

‡ *Comment. on Diseases of Children*, p. 83.

§ *Hamilton on Diseases of Children*, p. 88.

relates a similar case which occurred to Dr. Johnson; and Bouchut refers to one in Paris: the child was put into its coffin, and placed in a "chapelle," but the next morning it was found sitting up and playing with the ornaments by which it was surrounded. I need hardly say that the stethoscope will enable us to settle this question correctly.

Lastly, the intensity and frequency of the fits may augment instead of diminishing, and so terminate fatally. This, according to Brachet, "may occur in two ways, either primarily through the brain, which, being over-excited, ceases to act upon the other organs, hæmotosis does not take place, and death is certain; or primarily in the lungs, in which case, respiration, impeded by the irregular and violent contractions of the respiratory muscles, is imperfectly performed; the lungs become congested, the blood only circulates partially through them, suffocation is threatened, and does take place if more regular efforts do not restore the respiration and circulation. Lastly, syncope may occur, and be so prolonged as to prohibit a return to life."

So far, these are modifications of the ordinary kind of convulsion only. I shall notice a very curious variety, which has been called *Salaam convulsions* by Sir C. Clarke, and *Eclampsia nutans* by Mr. Newnham. It is a very rare disease. I believe Mr. West was the first in these countries to bring it under the notice of the profession. Sir C. Clarke had seen but three cases in his practice, up to 1839, and Sir Charles Locock only one. Mr. Newnham has published four cases* (including Mr. West's); another has been related by Dr. Willshire;† two others have been published in the *London Journal of Medicine*, translated from the German,‡ and two have been described by Dr. Faber.§ A case very much resembling this affection is described by Dr. Wright, of Montreal,|| but it appears to have been connected with catamenial disturbance, and since the first edition of this work I have seen one well-marked case and heard of another.

The essential symptom of the disease, is a bowing forward and downward of the head, so as sometimes almost to touch the knees; at first the movement is slow, but it increases in frequency until it attains great rapidity, so much as to be repeated 50 or 140 times in succession; when so rapid it degenerates into a mere nodding of the head. The attack, in some cases, is preceded by sleepiness, heaviness about the eyes, or casting them upwards. An attack not unfrequently comes on after awaking from sleep, and in other cases the child seems worn for want of sleep, which may be disturbed by spasms or screaming. Sooner

* British Record of Obstetric Medicine, No. 6, vol. ii., p. 3.

† London Journal of Med., June, 1850.

‡ Journal für Kinderkrankheiten, March, 1850.

§ Medico-Chir. Review, July, 1851.

|| British American Journal, April, 1850, p. 311.

or later other automatic movements occur, and the attack may ultimately involve general or local convulsions, paralysis or idiocy. In Mr. Newnham's first case, the child was attacked by paralysis, and her intellect became weak, but she ultimately recovered. Mr. West's case became idiotic, although the bowing ceased. In the third, there was partial paralysis of the upper extremities, with intellectual deficiency, and the fourth ultimately died, the attack continuing with intervals nearly to the end. In Dr. Willshire's case there was neither paralysis nor permanent injury to the intellect, and the patient recovered under the treatment adopted. One of the cases recorded in the *Journal der Kinderkrankheiten* became epileptic and semi-idiotic; the other improved under the use of iron. In the case which has been under my care, the child is idiotic, but as fine a specimen of bodily development as I ever saw. I shall take the liberty of giving some of Mr. Newnham's conclusions, as he has seen more of the disease than any other practitioner. He says: "This affection appears to be spinal in its origin; for although it will have been established by the foregoing cases that, previously to the attack, there had been some peculiar expression of the eyes, and some degree of heaviness, or of unwonted irritability, yet, as all the earlier phenomena are spinal, it must be classed as an eccentric affection; and the little disturbance of the cerebral manifestations may be explained by the reflex irritation of this morbid spinal agency, which has commenced, is proceeding, but has not reached that culminating point at which it interferes with the established harmony of the voluntary or semi-voluntary muscles. Though spinal in its origin, it will have been noticed that in every instance general convulsions will soon make their appearance, and cerebral symptoms will occur. The effect upon the manifestations of mind is most marked, consisting not in a simple arrest of development and defective nutrition, for then it would remain just as when the disease supervened, whereas it will have been seen that a desolating influence is at work; a morbid action has been established; and although this shall seem to be at rest for a time, and the mind shall grow during intervals of freedom from the attack, yet on a renewal of the distressing symptoms, it will be seen that the downward action is progressive, that the early sparklings of intelligence are obscured, and that the mischievous influence is proceeding surely, to the extinction of intellect in fully formed idiocy. Not only have the manifestations of mind been blighted, but in many instances paralysis has been a consequence, either in the form of paraplegia or hemiplegia; the kind of paralysis therefore has not been uniform, though in some form or other, and in a greater or less degree, it has been invariable. It is to be remarked that in each of the recorded cases, the severe attacks of the peculiar bowing have always been preceded by sleep; they have always been noticed to occur with especial severity in the morning after the night's sleep, or after the customary morning nap. There is evidently in this malady a family alliance with epilepsy, and hence, as has been demon-

strated by the foregoing cases, it often passes into epilepsy, or some other form of infantile convulsions. Tetanoid symptoms do also sometimes occur during its progress. There are some differences in the phenomena described, which it would be right to notice: *a.* During the paroxysm the hands were closed in Nos. 2 and 3, but they were expanded in No. 4, showing, that in the former cases, irritation of the flexor muscles, in the latter of the extensors, was predominant. *b.* The throwing the head backward in No. 2, appears only to have been a consequence of muscular and general feebleness, whence the head, from its own weight, fell backward for the want of adequate support. *c.* In No. 2 the irritation of the *decaying teeth* seems to have been the greatest in 1843, when the peculiar bowing affection was relieved; but in No. 4 the bowing affection was aggravated when teething irritation was greatest. The fondness for music, pictures, or gay colors, has been so marked in some of the above cases, that it should be noticed, as it shows that the injurious impression has not been made upon the organs of sense, and as the judicious employment of these senses would form a most important part of the future educational treatment, because affording large inlets of knowledge, and to the development of sentiment and affection.”*

Mr. Newnham inclines to the opinion that the essential character of the disease is inflammatory action of a weak and strumous nature, of the membranes investing the medulla oblongata, afterwards extending to other parts.

Dr. Willshire considers it probable that the disease is purely centric in its origin, having its first seat in the sensorium, or in those important parts placed between the “hemispheric ganglia” and the top of the spinal cord, and afterwards in the lower or non-sensorial portion of the spinal apparatus, as proved by the general automatic movements being in some cases of a decided tetanoid character. In others these movements were distinctly epileptiform, and moreover hemiplegia has followed, the former circumstance still further indicating, as the seat of mischief, the assemblage of ganglionic centres between the cerebrum and spinal cord, whilst the latter and the supervening affection or obliteration of the intellectual powers appears to prove the secondary involvement of the great hemispheric lobes. The essential peculiarity of the disease, Dr. Willshire thinks, may be some change in the circulation of the minute vessels of a scrofulous character.

There is a species of convulsive affection which has been described by Jadelot and Guersent, and which is deserving of notice. It is not a general convulsion, but a tonic contraction of the muscles of the upper and lower extremities. It is observed in young infants, and also in children approaching the age of puberty. The wrists and fingers

* British Record of Obstetric Med., vol. ii., No. 6, p. 18.

become remarkably rigid, both being partially flexed, and when the lower extremities are also affected, they are stretched out instead of being bent. The muscles are felt to be rigid and tonic, and their outline may be distinctly traced underneath the skin.

This tonic contraction may continue for hours or days, and in some cases it has lasted for years, but its duration is generally shorter. It may cease spontaneously, or under the influence of treatment, and return. It is seldom accompanied with disturbance of other muscles, or of the intellect, respiration or digestion. The pulse is sometimes, though rarely, affected. It is evidently a disease of reflex irritation, and may in general be traced to a gastro-intestinal irritation of some kind, or to dentition, or to a vitiated atmosphere. It rarely terminates fatally, and in cases where an autopsy was made, neither Jadelot nor Guersent found any appreciable alteration in the brain or spinal marrow.

Diagnosis.—1. *From Epilepsy.*—A single convulsion and a single epileptic fit resemble each other so closely, that it would be difficult to point out any marked distinction; there may be a difference in the intensity and extent of the convulsive movements; in the sudden onset and frequency of the fits; in the history of the case and its termination; but time is, after all, the principal test, the course of the two diseases being very different.

2. *From Chorea* the distinction is easy, for in it the motions are slighter, not altogether involuntary, nor accompanied by insensibility. Even at the commencement of an attack of chorea there is but little resemblance to the involuntary violent motions, partial or general, of convulsions, and there is no loss of consciousness.

3. But the diagnosis of the *cause of the convulsions* is of far greater importance, as Rilliet and Barthez have observed, than the differential diagnosis.

Suppose we are called to a child from one to six years old, strong, and hitherto healthy, who has had a convulsion following a fright, blow, fall, indigestion, &c. The convulsions may, of course, be primary, sympathetic, or symptomatic, but upon further inquiry we find that the child was perfectly well up to the moment of the attack, that the exciting cause is plain, the constitution sound, the access not very violent, and that there are no other head symptoms. So far, then, the case is one of primary or sympathetic convulsions; but further investigation proves that there is no disease of the chest, abdomen, &c., and we conclude that the convulsions are primary or essential.

But if, on examination, we discover evidences of pectoral or abdominal disease, acute or of long standing, we must then infer that the convulsions are sympathetic, and we cannot be too minute in our examination of all the organs in every case, as the treatment as well as the diagnosis will depend upon it. In these primary and sympathetic attacks the brain and nervous system are only in a state of

sympathetic irritation, in most cases, but we cannot be quite sure of this when the fit comes on in the course of some chronic disease, as, for instance, in tuberculous affections, in which it is quite probable that the brain may be the seat of a similar deposit. Such cases render the diagnosis very difficult.

After six or eight years of age, it is rather rare to find a child attacked with either primary or sympathetic convulsions; they are almost always symptomatic of disease of the nervous system. MM. Rilliet and Barthez state that, with one exception, all the twenty-five cases of sympathetic convulsions observed by them were under seven years of age. Moreover, the absence of adequate exciting causes, the freedom from organic disease of the chest and abdomen, will exclude the primary and sympathetic forms, and we shall generally be able to detect other symptoms of head disease existing at the time, and previously, in addition to the convulsions.

Prognosis.—The prognosis in *primary* convulsions will depend upon their intensity and frequency, upon the age and strength of the patient, and in some degree upon the cause; for instance, when they arise from indigestion, cold, &c., they are less dangerous than when they are caused by a fright or wound, or any mechanical cause. If the attacks be partial or slight, with long intervals, without much acceleration of the pulse or congestion about the face and head, and with recovery of intelligence during the intervals, the child will almost certainly recover; but if they be general, with a quick pulse, great congestion, and a frequent repetition of the fit, the danger is very great. I have no doubt that Bouchut is right in stating that primary convulsions are the least fatal.

Sympathetic convulsions have a more serious character, because of the complication; the child has to contend not merely against the affection of the nervous system, but against the organic disease giving rise to it, and the danger is more than doubled. Moreover, in some complications, as in hooping-cough, for example, the original disease is a perpetually recurring cause; each fit of coughing throws so much stress upon the brain, that the convulsions are reproduced at the very moment when they seem to have been relieved. The convulsions which occur in the course of fever, and which assume, as it were the place of delirium, are rather favorable, according to Sydenham; and certainly those which are preceded, and perhaps caused by diarrhoea are more manageable than the other varieties of sympathetic convulsions.

In *symptomatic* convulsions the prognosis is always serious, and generally unfavorable when they occur in the course of the disease of the nervous system; less so when at the commencement.

Mr. North remarks that the younger, and the more susceptible the child, the less is the danger, and also that they are less serious in girls than in boys.

Treatment.—In proceeding to treat a case of convulsions, we should

first ascertain to which of the varieties it belongs,* whether it is primary, sympathetic, or symptomatic; we must bear in mind, also, the constitution of the child, its previous state of health, previous attacks, &c. &c. The treatment also will vary in some degree according as we are called during the fit, or during an interval.

If we see the child during a fit of partial convulsions, our first duty is to remove any exciting cause which may be present. Thus, all tight bandages should be loosened, all pins removed, the dress made quite easy, and the child placed in a recumbent position, exposed to plenty of fresh air. If the gums be swollen or congested they must be freely lanced down to the teeth, and beyond those teeth which are pressing forward. If we do not cut deeply or extensively enough, very little relief will be afforded. After this the child should have a warm bath for a few minutes, and then be carefully dried, and wrapped in a warm blanket.

It may be that these measures will relieve the paroxysm, but whether or not, the next question is as to the propriety of abstracting blood. Almost all writers are in favor of it, and whatever experience I have had only confirms their opinions, with very few exceptions. If the convulsions be very slight or partial, if their be no flushing of the face, no quickening of the pulse, it is probable that lancing the gums, a warm bath, and a smart purgative may be sufficient. Again, in some cases of sympathetic convulsions, in the course of, or at the termination of other organic diseases, when the infant is much reduced, it may not be able to bear the additional loss of blood; in such cases we must have recourse to counter-irritation. Lastly, in symptomatic convulsions, the propriety of bloodletting must be in a great measure determined by the nature and extent of the original disease.

But in severe cases of primary convulsions, when the pulse is quick, the face and head flushed, and the paroxysm well marked; in sympa-

* "Inasmuch as convulsions are a frequent attendant on diseases of the brain, it is certainly very natural to turn our attention first to the nervous centre. It often happens, however, if much care be not taken to investigate a case thoroughly, that leeches and cold applications to the head are hastily ordered, and calomel given, when the presence of pneumonia is afterwards detected, or some cause of gastric disturbance found to exist, without due attention to which no permanent amendment can result from any treatment. Inflammations of the chest are peculiarly liable to lead into this kind of error. Their real symptoms are masked by convulsive seizures; the medical attendant fancies on the first day that the case is one of inflammation of the brain, on the next day he thinks it must be pneumonia, and thus the uncertain diagnosis leads to vacillating treatment, and much mischief is the result.—*Mauthner on Diseases of the Brain, &c., in Children, British and Foreign Review*, April, 1846, p. 392.

thetic convulsions, at the commencement of diseases of the lungs or abdomen; in the febrile diseases of children, or during their course, if the child be strong; and in symptomatic convulsions, at the outset of cerebral disease; there is no doubt in my mind that a liberal application of leeches is of the greatest service. It is not enough to apply one or two leeches, but, *e. g.*, to a child of a year old, six at least ought to be applied, *and the bleeding stopped when the leeches detach themselves*. I must strongly protest against the ordinary plan of allowing the leech-bites to bleed indefinitely; more blood is thus often lost than was intended, and it is quite impossible to form any precise estimate of the quantity desired or actually taken, unless by arresting the hemorrhage at a given time. If the convulsions return, the leeching must be repeated, nor need we fear for the child if it be strong and healthy; there is more danger of our not bleeding sufficiently than of the other extreme in these cases, especially in cases of threatened meningitis. My friend Dr. M'Donnell's child, of four months old, was attacked by meningitis ushered in by violent and almost incessant convulsions. I applied eighteen leeches in the course of twelve hours with perfect success; the convulsions altogether ceased after the last application, and the child recovered.

As to the best situation for applying the leeches, some advise the forehead or behind the ears, others the back of the hand or foot, the ankles, or the anus. I prefer the forehead as being nearer the seat of the disease, and requiring fewer leeches to produce an equal impression, and because it is easy to stop the bleeding. North advises that "blood should be drawn from the jugular vein, or from the temples by cupping."

At the same time we may diminish the vascular action of the brain by the application of cold lotions or ice in a bladder. Dashing cold water upon the face will sometimes terminate the fit: and next in efficacy to this, according to Dr. John Clarke, is the effluvia of volatile alkali plentifully inhaled.* For the purpose of diminishing cerebral congestion, MM. Dezeimeris and Trousseau have proposed compression of the carotids, and, it is said, with success. Drs. Bland and Stroehlin have published some favorable cases,† and Mr. North thinks favorably of it in cases of great weakness and exhaustion. Barrier, however, states that it rarely succeeds.

So far the remedies I have mentioned may be employed during the paroxysm; our treatment, however, must be continued during the interval of quiet which succeeds. The repetition of leeching must be decided by the repetition of the convulsion, or the occurrence of slight convulsive twitchings, or of much starting in sleep. If these are absent, and if the infant sleep calmly, no further leeching will be necessary;

* Commentaries on Diseases of Children, p. 109.

† Med. Chir. Journal, April, 1839.

but measures must be taken to act briskly upon the bowels by means of calomel and jalap, or rhubarb, castor oil, infusion of senna, &c. Or a purgative enema may be given in order to produce the effect more quickly, or whilst the child is unable to swallow. The advantage of evacuating the bowels is twofold; any indigestible or irritating matter is removed, and we establish a derivation from the brain. Dr. Condie speaks highly of the effects of spirits of turpentine in cases dependent upon derangement of the alimentary canal, and my own experience amply confirms his observation; combined with castor oil it acts promptly and beneficially.

M. Brachet recommends calomel pretty largely; two grains every two hours. Mr. North objects to this; but although I have not given it in the full doses recommended by M. Brachet, I have certainly found benefit from smaller ones, say half a grain three times a day, in combination with as much Dover's powder, and a grain of James's powder.

Next to intestinal derivatives, those applied to the surface are the most effectual. Fomentations of hot water with mustard to the feet and legs, and blisters to the neck, upon the head, or behind the ears, will be advisable. Mr. North recommends mustard sinapisms to the feet; Sydenham a blister between the shoulders; Dr. John Clarke one to the calves of the legs, or between the shoulders. The blister should not be applied too soon; it will be quite time enough after the baths, leeching, and the free evacuation of the bowels; I think also that a succession of small blisters is much preferable to one large one: a narrow strip may be applied across the forehead, then one behind each ear, or if necessary, the upper part of the head may be shaved and then blistered.

With children of delicate constitution, or who have been much exhausted by any cause, leeching is sometimes impossible, and then our principal reliance must be upon a succession of blisters. When the attacks are often repeated, so that the disorder becomes chronic, I have seen great benefit result from a seton of three or four silk threads in the arm, and continued for some time, particularly in the convulsions arising from dentition. An argument for the use of counter-irritation to the scalp has been derived from the fact, more than once observed, that convulsions have ceased on the appearance of an eruption of crusta lactea. Professor Ettinger has recommended that the eruption should be produced by inoculation, but a blister will act just as effectively. M. Husson states that he has relieved convulsions by vaccination.

Dr. Grantham considers non-ossification of the fontanelles as one cause of convulsions, which he proposes to remedy by compression of the head generally, with a calico bandage applied moderately tight, and he quotes one case in which he succeeded.

Antispasmodics of various kinds have been strongly recommended; by German writers camphor and valerian are especially praised, by others ether, assafoetida, musk, bismuth, ammonia, &c. Drs. Underwood and Stewart speak very highly of musk given freely, that is,

from half a grain to two grains every two hours. Dr. John Clarke, however, states, that he has seen no good effects from any, with the exception of ether and ammonia: "It does not appear to him that they derive any additional good quality from mixing them with assa-fœtida, valerian, castor, musk, tinctura fuliginis, amber, and other fœtid substances."* I have no doubt that the inhalation of ether or chloroform will be found beneficial in many cases, both in stopping the convulsion, and in preventing its recurrence. I have used it in a case of convulsion complicating whooping-cough, with benefit. Dr. Simpson has also used it with perfect success in the case of an infant five weeks old, who had severe convulsions for nearly a fortnight: he was under its influence for nearly twenty-four hours, allowing him to wake for food; and he emerged from the sleep perfectly well with no return of the fits. Mr. Williamson, of Manchester, has recorded the case of an infant, six weeks old, whom he kept constantly under the influence of chloroform for sixty hours, sixteen ounces having been used, with complete success.†

Sir Charles Locock speaks highly of the subcarbonate of iron in cases where the child has been much exhausted by other diseases.

The oxide of zinc has been much relied upon by M. Zangerl, who gives one and a half to three centigrammes every two hours; by M. Brachet, who combines it with the extract of hyoscyamus, ten centigrammes of the former and twenty of the latter in the twenty-four hours; and by MM. Guersent, Blache, and Barrier.

Narcotics have been sometimes advisable, but they are rarely necessary, and when given require great watchfulness in their administration; perhaps the best mode is to combine a little Dover's powder with calomel or James's powder. Mr. North recommends Dover's powder when the infant is restless, with startings and twitchings. Brachet, Blundell, Condie, and others, prefer hyoscyamus, either alone or in combination. The external application of opium has also been advised. If used at all, we should begin with very small doses, watching their effects, and only increasing them very gradually. They should never be given when the pulse is full, when there is much fever, general plethora, or determination to the head. When diarrhœa is present, or when the nervous irritability is very great, I have seen them very useful. Dr. John Clarke remarks: "It requires the greatest consideration and the exercise of great circumspection to determine when and in what quantity opium may with propriety be exhibited in convulsions. It may fairly, however, be laid down as an axiom, that it should never be employed on any account, until it is clearly ascertained that no danger is likely to arise from pressure on the brain; that there is not any existing inflammation of that organ: and never until the bowels have been completely unloaded, lest the stupor arising from a compressed

* Comment. on Diseases of Children, p. 108.

† Lancet, June 11, 1853, p. 535.

brain should be attributed to opium; and the time when alone relief could have been given in inflammation of the brain should be allowed to pass by, never to be recalled. When the medical attendant has reason to believe that no danger is to be apprehended from any of those circumstances, opium in small doses, cautiously repeated, may be administered with advantage, and it will sometimes diminish pain by lessening the sensibility and irritability of the patient. Great care must, however, be taken, during the use of it, to keep the intestinal canal free."* Dr. Russell, of Limerick, has mentioned to me, that he has derived great benefit from the use of prussic acid, in doses of one-twelfth of a drop every hour, and in a few cases in which I have tried it, it seemed to soothe the child and diminish the convulsion. It is particularly suited to cases of convulsions complicating whooping-cough.

Alkaline medicines will be of service, when we are satisfied of the presence of acid in the stomach.

Thus we find the primary convulsions may be arrested and relieved by cold affusion, warm baths, bleeding, &c., after removing all apparent causes; that during an interval the principal remedies are, perhaps, a repetition of the bleeding, purgatives, counter-irritation, antispasmodics, and narcotics; and that in a chronic state of the disease, when the fits are repeated, great benefit is derived from a permanent drain upon the constitution.

But a little deviation from the ordinary treatment is often advisable. When the patient is delicate and weakly, or run down from other diseases, it may be necessary to give tonics and stimulants: Barrier and others speak highly of ammonia. In some cases we are obliged to give wine, with great caution however, and nourishing diet; in other cases a change of air is highly beneficial, or, if the infant be suckling, a change of nurse: this is strikingly the case when whooping-cough is complicated with convulsions.

In *sympathetic* convulsions, the treatment of the secondary affection must necessarily in a great measure depend upon the state of the primary disease and the condition of the child. In the majority of cases we shall have to content ourselves with measures of less activity, such as counter-irritation, cold to the head, antispasmodics, &c.; leeches or cupping will only be admissible in few cases. But as a compensation, we shall generally find that the remedies which benefit the original disease will relieve the convulsions. In febrile diseases ushered in by fits, however, the local treatment may be pretty active.

The same observations will apply to *symptomatic* convulsions, except those cases where the convulsion ushers in the disease, or occurs at a very early period in an inflammatory affection; then, indeed, so far from diminishing the activity of our treatment, we must rather increase it. The convulsions which accompany the chronic organic diseases

* Comment. on Diseases of Children, p. 108.

of the brain require delicate management, and a nice adjustment of remedies, but of these I shall speak at length when I treat of those diseases.

The treatment of *eclampsia nutans* so far has been satisfactory. Every species of irritation must be removed, the gums lanced, bad teeth removed, the bowels freed, the diet regulated, &c. The food should be nutritious, but unstimulating, and as far as may be of a dry character, according to Mr. Newnham. Calomel and preparations of steel seem to have been beneficial in some of Mr. Newnham's cases, and rather injurious in others. Prussic acid seems to have palliated the symptoms, and opium to have aggravated them.

Dr. Willshire's remedies were blisters behind the ears, keeping the bowels freed by castor oil, and the internal exhibition of the iodide of potassium and the disulphate of quinine.

In one of Dr. Faber's cases, purgations, baths, cold affusion, antispasmodics, embrocations, &c.; all failed to mitigate the disease, and in the other little or no benefit was derived from frictions to the nape of the neck with tartar emetic ointment; quinine and antispasmodics, cold affusions, and warm douches seemed to do harm, but the patient improved somewhat under the use of iron.

The treatment for *tonic convulsions* of the extremities consist of frictions and warm and vapour baths, and gentle purgatives. M. Jadelot recommends cold affusion, frictions with ether or tincture of digitalis, and internally camphor or valerian. M. Guersent advises frictions with a liniment containing laudanum, and if this fail, laudanum internally. Diaphoretics have also been recommended, and the sesquicarbonate of iron in large doses. With patients of a full habit, venesection may be necessary. Contrivances for the extension of the limbs may be tried in conjunction with warm baths, emollient frictions, and in some cases they seem to have succeeded. Section of the contracted muscles has been proposed, but it seems to me a very unscientific proceeding, and I believe has not been attended with any success.

The diet of children attacked by convulsions should in general be simple and bland; milk in any form, rice, arrowroot, &c. will be suitable and sufficient until the severity of the disease is subdued. Animal food and wine should in general be prohibited, except as I already said, where there is great exhaustion, or in some cases of sympathetic convulsions. In them it may be necessary to allow a little broth.

Cool, fresh air in a large room is very desirable, and in many cases assuming a chronic character a complete change of air is most beneficial. I need not dwell upon the necessity of a warm, loose dress, and the removal of everything which can irritate.

But perhaps the most important and most neglected hygienic arrangement is perfect quietness; the nervous system has been so shattered that quietness is essential to its recovery, and yet if there be any improvement the nurse and parents are so delighted, that they invari-

ably set about amusing and exciting the child, to obtain renewed evidence of its restoration. The room should be darkened, and nothing done to excite the child; the longer it sleeps the better.

As to the consequences of convulsions, little direct treatment is necessary; the weakness of the limbs or of one side will in most cases gradually diminish; gentle frictions or salt water baths may be employed, and, with country air and exercise, will generally succeed.

In like manner the squinting gradually diminishes in many cases: for the more marked cases various contrivances have been proposed. Mr. North relieved it by an ivory instrument, covering each eye, and pierced with a minute aperture; or we may sometimes succeed by tying up the sound eye, and using the distorted one. Dr. Jurin prefers the following method: "Place the child before you, and let him close the undistorted eye and look at you with the other. When you find the axis of this eye fixed directly upon you, bid him endeavour to keep it in that situation, and open his other eye. You will immediately see the distorted eye turn away from you towards his nose, and the axis of the other will be pointed at you; but with patience and repeated trials he will by degrees be able to keep his distorted eye fixed upon you, at least for some little time after the other is opened; and when you have brought him to continue the axis of both eyes fixed upon you as you stand directly before him, change his posture; put him first to one side of you, and then to the other. When in these different situations he can perfectly and readily turn the axes of both eyes towards you, the cure is effected."*

* North on Convulsions, p. 215.

CHAPTER VI.

ACUTE MENINGITIS—ACUTE ARACHNITIS—

ACUTE HYDROCEPHALUS.

THE disease I purpose describing in this chapter has been termed by some dropsy of the brain, water in the head, internal hydrocephalus; by Cullen, hydrocephalic apoplexy; by Macbride, hydrocephalic fever; by Bricheteau, hydrocephale aigue; by Gardien, Capuron, and others, fièvre cerebrale; by Brachet, hydrocephalite; by Rufz, Piet, Guersent, Green, Barrier, Rilliet and Barthez, &c. meningite tuberculeuse; by the Germans, hitzige gehirnhöhlenwassersucht.

By whatsoever name described, and however various the theories as to the nature of the disease, it appears to me that both the symptoms and the *post-mortem* appearances indicate an affection of the membranes of the brain as the essential character of the disease, whether primary or secondary; and as that affection exhibits evidences of inflammation or of its results, I prefer using the simple terms prefixed to this chapter. Modern writers, indeed, particularly the French, have drawn a marked distinction between acute meningitis and tubercular meningitis; but as the distinction during life is in many cases impossible, and in almost all very obscure, I have thought it better to include both under the one name, and to describe them as two (out of many) phases of the same disease.

The earliest record of the disease is by M. Duvernay in 1701, and by Messrs. St. Clair and Paisley in 1732–3, in the *Edinburgh Medical Essays*. In 1768, Dr. Whyte's essay "On the Dropsy of the Brain" was published, and as a minute and accurate description of the disease, it is admirable, but his pathological reasoning is incorrect. In the same year, Dr. Fothergill and Dr. Watson read their papers on the subject to a society in London, and afterwards published them in the fourth volume of the *Medical Observations and Inquiries*. The former physician regarded the disease as incurable, and so would Dr. Watson but for one case of recovery, which hardly appears to have been owing to the treatment. A case of hydrocephalus internus, published by Dr. Dobson in 1775, was the first in which mercury was used, and as it was successful it made a considerable impression, and led to the general use of this remedy in the disease. As yet the theory of Whytt and others, that the affusion of fluid into the ventricles depended upon debility of the vessels, or an attenuated state of the blood, prevailed. In 1779, however, Dr. Charles Quin published an inaugural essay, founded upon information derived from his father, Dr. Henry Quin, an eminent physician of this city, in which he attributed the disease to determination of blood to the brain, to increased arterial action, and

effusion of fluid as a consequence. The practical result of this theory was the employment of antiphlogistic remedies, as venesection and cold applications to the head. In a more advanced stage of the disease he recommended mercury, on the principle laid down by Dobson, for the purpose of stimulating the absorbents of the brain. This essay was afterwards enlarged into a treatise. Dr. Withering, in his *Account of the Foxglove*, published in 1785, agrees with Dr. Quin in regarding the disease as inflammatory, and the effusion as the consequence, not the cause, of the illness.

Dr. Rush, in the *Medical Observations and Inquiries* for 1789, added some important information to the previous knowledge of the disease. Admitting the occurrence of primary hydrocephalus, he showed that it may be caused by other diseases; and he carried blood-letting to a greater extent than his predecessors, even affirming that hydrocephalus may be cured by the lancet. In 1791, Dr. Percival, of Manchester, published a valuable paper in the first volume of the *Medical Tracts and Observations*, containing a *post-mortem* examination of a case in which death took place before affusion, and recommending the combination of opium with calomel. Dr. Garnett, in 1801, maintained that the disease consists in a plethoric state of the vessels of the brain, occasioning a considerable degree of inflammation, and generally, though not always, giving rise to affusion. In 1808, Dr. Cheyne's first essay was published, confirming the value of mercury in the disease, and clearly establishing the secondary character of some varieties of hydrocephalus. To this work, confessedly of very high value, I shall refer more particularly by and bye. Although at this time it was pretty well agreed that the disease was inflammation, there continued to be some dispute as to its exact locality, although Briche-teau and others regarded the affusion as the principal phenomenon. Gölis (1815), Piorry (1822), placed the seat in the arachnoid; Coindet in the cerebral ventricles; Brachet in the lymphatics; Abercrombie in the brain; M. Senn (1825), in the pia mater, and he first applied to it the term meningitis; M. Piorry (1823), and MM. Parent-Duchatelet and Martinet (1825), in the arachnoid. In this country and America, we have had valuable works and monographs by Drs. J. Clarke, Monro, Duncan, Yates, Mills, D. Davis, Burnett, Griffiths, J. R. Bennett, H. Smith, &c., &c.; and more or less space devoted to its consideration in the works of Underwood (late editions), Dewees, Burns, Maunsell and Evanson, Eberle, Stewart, Condie, Coley, and Hood. The recent communications to the different periodicals will be found in Braithwaite or Ranking's *Retrospect*, and to which I shall hereafter refer.

More recently great light has been thrown upon the pathology of the disease by the valuable essays of Guersent,* Papavoine,† Fabre

* Dict. de Médecine, p. 392.

† Journ. Hebdom., vol. vi. p. 113, 1830.

and Constant, Gherrard,* Ruz,† Piet,‡ Green, Schweinger,§ &c., who have demonstrated the existence of tuberculous meningitis.

Dr. J. R. Bennett, in his excellent treatise, gives the following statistics: Of 1,000,000 of each sex, the annual mortality by hydrocephalus, in 1837, was 562 males and 460 females; in 1838 it was 574 males, and 450 females; in 1839 it was 571 males, and 439 females. In Berlin, in the year 1833, the deaths below 15 were 4009, of which 196 were from cerebral inflammation and hydrocephalus. In 1835, the deaths below 15 were 3477, of which 257 were from acute hydrocephalus. Coindet states that on an average 21 children die annually in Geneva of hydrocephalus, out of a population of 22,000. Bouvier estimates that in Paris 1000 children are attacked annually, of whom 750 die. Hasse considers that from 32,000 to 36,000 children die annually from this disease in the Prussian States, and 100,000 throughout Germany. Dr. Alison states that of 201 deaths below the age of 15, at Edinburgh Newtown Dispensary, 40 died of hydrocephalus; of 1862 cases, under 7 years, at the Marylebone Dispensary, Dr. Boyd says that 67 were inflammation of the brain or membranes. At the Rains Institute for children, of 56 deaths 9 were from this disease. Of 62 deaths at the Bonn Chirgon, 12 were from this disease.

I. After this brief historical notice, I shall endeavour to sketch some of the various phases or forms of the disease sufficiently distinct to merit especial mention, and having corresponding pathological conditions. The first corresponds to the acute hydrocephalus of Gölis and others, and to the "meningite simple aigue" of Barrier and Rilliet and Barthez. It is not the most common, but very far from being rare.

The different stages into which authors have divided hydrocephalus are not always to be clearly distinguished in this form. Conradi and Rush made two stages; Whytt, Cheyne, Tissot, Vanhoven, Baader, Plenck, Sprengel, &c., three; Gölis four stages: but most frequently but two stages will be remarked, that of excitement and effusion.

In some cases a formative period may be observed, during which the child loses his spirits and cheerfulness, exhibits a distaste for his usual amusement and toys; the eye has lost some of its lustre, the face is somewhat collapsed and pale, and there is a kind of creeping or chilliness over the body. The pulse is uncertain; sometimes quick, perhaps irregular, in other cases but little altered from its natural state.

In most cases, however, the development of the disease is sudden, and marked by high fever, thirst, heat of skin generally, and particularly of the head, sometimes, as I have seen more than once, by a

* American Journal of Medical Science, April, 1834.

† Thesis, 1835. ‡ Ibid., 1836.

§ Über Tuberculose als die gewöhnlichste Ursache der Hydrocephalus acutus.

convulsion. The child complains of severe pain in the head, if old enough to express its sensations ; and if too young, we find it clasping its head ; or constantly raising its hand to that part ; unable to support the weight and suffering, it seeks to rest it upon something, rolling it about incessantly ; or lying still, heavy, and dull, with an occasional cry of pain.

In some cases the eyes have a heavy, muddy expression ; more frequently they are bright and restless, moving quickly from one object to another, and the conjunctiva more or less injected. There is a peculiar stare, a wide opening of the eyes, so that the white is visible all round the iris, which I have found very characteristic of the commencement of meningitis. The infant is generally very wakeful, or sleeps restlessly, drowsy, but waking up suddenly, crying or screaming as if from fright ; if it sleep continuously, we may observe frequent startings and twitchings of the limbs. When awake, it is evidently oppressed, sighing, agitated, and uttering a cross, whining cry ; complaining, if old enough, of pains in different parts of the body, about the neck, shoulders, or stomach.

Dr. Mills mentions an irritative cough in the first stage.* Alibert adds to this an extreme difficulty of respiration, which he considers to indicate the commencement of compression. Dr. H. Smith notices this cough as occurring in all the stages ;† and I saw this difficulty of respiration precede every other symptom in one of my own children attacked by the disease. It was remarkable, too, that the difficulty was in expiration, not in inspiration.

The stomach almost immediately sympathizes with the cerebral disturbance ; there is complete loss of appetite, and in almost every case vomiting, sometimes concurrently, in others alternating with the headache. The tongue is white and loaded, the bowels generally constipated, and occasionally most obstinate ; when they are free the stools are peculiar, greenish, tenacious, glairy, and foetid. The urine is frequently scanty and high-colored or cloudy.

If not at the beginning, yet before the disease has lasted long, a convulsion occurs, complete or partial, with only a temporary loss of consciousness. Generally speaking, it is not repeated until a later period of the disease, but in some severe cases I have known them to recur at short intervals. By this it may often be distinguished from the convulsions ushering in the eruptive fevers.

Thus far the disease advances with different degrees of rapidity in different individuals, nay, in some cases, as Gölis has remarked, there is an occasional remission, as if the child were about to recover, after which the symptoms return with greater violence. The fever rapidly becomes intense, with occasional intermissions, the heat of the head is

* Transactions of the Association of the College of Physicians in Ireland, vol. v. p. 438.

† On Hydrocephalus, p. 12.

great, the headache is severe, with delirium, generally moderate, but in many cases with loud outcries, especially as Parent-Duchatelet and Martinet have remarked, when the convexity of the arachnoid is principally affected;* the head is declared to be the seat of the suffering, either by words or gestures; and the face is pale and livid, or with a circumscribed hectic flush on one or both cheeks. The eyes are generally bright but sunk, the pupils contracted, and painfully sensitive to light, as the ears are to sound, and the whole expression of the countenance is not to be mistaken. The pulse is quick at first, then occasionally irregular, and at last intermitting; but these changes are by no means so regular as in some of the other varieties. The respiration is at first hurried, then unequal, sometimes slow and oppressed, and ultimately irregular, a few rapid respirations being followed by an interval of rest; the accordance between the pulse and the respiration is no longer observed.

The vomiting in most cases continues, and generally the constipation increases. The child is restless and uneasy, seldom lying still, and awaking from sleep with loud cries, or when asleep disturbed by startings and twitchings.

There is a sign which has been recorded by some American physicians, which I ought to mention here, although I can give no opinion as to its precise value. I allude to the information derived from cerebral auscultation. Dr. Fisher, of Boston, was the first to apply auscultation to the brain, and he published a valuable paper in the *American Medical Journal*.† He has since been followed by Dr. Whitney,‡ who certainly deserves great credit for the care and labor he has bestowed upon the subject. He describes four sounds heard in the brain in certain diseases: 1. The cephalic bellows sound; 2. Cerebral ægophony; 3. Fremissement cataire, and 4. The cooing sound. The first, or bellows sound, is heard in "cerebral congestion, acute cerebral inflammation, hydrocephalus, compression of the brain, scirrhus induration with softening, ossification of the arteries of the brain, and the hydrocephaloid disease." This is the only sound with which we have to do, and its value is, of course, diminished by the extremely different diseases in which it is heard, and occasionally by the difficulty of detecting it. Still it is a subject worthy of minute attention, and may ultimately lend important aid to the diagnosis.§

* De l'Arachnitis, p. 207.

† March, 1838.

‡ American Medical Journal, October, 1843, p. 282.

§ The subject of cerebral auscultation has also engaged the attention of Dr. Wirthgen, of Leipzig, and an abstract of his views, as set forth by Dr. Hennig, is given in the Medical Times and Gazette, May 9, 1857, as follows:—"Certain sounds are audible when the ear or stethoscope is placed on the anterior or posterior fontanelles, and, in some children, the lateral fontanelles. The sounds may

As the disease advances, the symptoms gradually change from those of excitement to those consequent upon effusion and pressure, and earlier in those cases where the sutures and fontanelles are closed than in those where they are incomplete. The headache is less complained of, although the head is still rolled about uneasily, or retracted; the delirium subsides, or occurs occasionally; the sensibility of the eye is gradually lost, and the pupil is generally dilated, and it is evident the child can no longer see; the eye is rolled about, turned upward, or squinting takes place; the hearing may for a time appear acute, but at length it diminishes, and the infant appears unconscious of sound;

sometimes be heard along the lines running from the anterior fontanelle to the temporal region, as also, though less frequently, and less plainly, along that connecting the two fontanelles. In some children, not only are the sounds heard in all these places, but on the whole cranial vault, down to the spinous processes of the cervical vertebrae. Weber's flexible stethoscope is usefully employed when the child is restless or lying in bed. These sounds may be heard from about the twentieth week to within the sixth year, at all periods of the day and in all positions of the body. In some they are perceived in the eighteenth week, and in others in the twenty-second or twenty-third, and continue as a rule until the fontanelles are closed in the third or fourth year. There are other sounds distinguishable from these, which are perceptible in the vicinity of the closed large fontanelle, but not before the fifth year. The earlier of these consists in a uniform vesicular sound, which gradually subsides into a gentle murmur. It is unaccompanied by any tone, although liable to be rendered louder during violent respiratory efforts. The sound which is heard at the later period, is composed of a double impulse, a stronger and a weaker one. The former, which are audible in the heads of healthy children from the eighteenth or twenty-third week, are, in the author's opinion, dependant upon the arteries of the brain, and he enters into a long disquisition upon the physical properties of these vessels." "This vesicular sound is louder in proportion to the advanced ossification of the skull (the fontanelles being still open), the development of the general muscular system, the strength of the impulse of the heart, the more yielding conditions of the walls of the blood-vessels, and the watery condition of the blood. It is more feeble when the nutrition and strength of the child are defective; when the cranial bones are thin and soft; on recovery from hydræmia; and at the commencement of those conditions which give rise to abnormal tension of the coverings of the brain. The sound entirely disappears when the cerebral vault is closed; in very feeble, atrophic children; in acute hyperæmia; in exudation and transudation without the cranium; and when the sinuses are obstructed by coagula."—*Vierordt's Arch.*, 1856, p. 411.

the sense of touch remains longer than any other, and at a period of apparent insensibility I have noticed the child uneasy at being touched or moved. Dr. Hennis Green has noticed a temporary but firm contraction of the eyelid, which for a time prevents our exposing the eyeball.

When the effusion or pressure is moderate, the convulsions increase in frequency, and sometimes in strength; or perhaps there may be convulsions of one side of the body, and paralysis of the other; when the effusion is rapid and excessive, there is often neither convulsion nor paralysis, but coma and rapid sinking. And a new symptom is developed about this time, which adds much to the distress of the mother. I allude to the sharp, piercing scream of agony which the child utters from time to time, and which, I am sure, is the result of pressure upon some particular portion of the brain, and not of pain, as the face at the time is not expressive of suffering. This peculiar hydrocephalic scream, which occurs in no other disease, and not in every case of this, has been noticed by almost all writers, but they differ as to the time when it appears. Some, as Stewart and Condie, place it during the inflammatory stage, others at a more advanced period, at the commencement or after the occurrence of effusion. My own experience confirms the latter view.

During the intervals of the convulsions, consciousness and sensibility diminish until they are finally lost. Sometimes local spasms occur; I have seen well-marked spasms of the glottis and crowing inspiration. The child now lies quiet, occasionally moving the head, or throwing about an arm or leg unconsciously; the eyes are open or only half closed, and acquire a glazed appearance, with mucus at the corners of the eye-lids; the face is pallid, sometimes waxlike, without expression; sometimes sunken and anxious, as representing the last conscious feeling. The vomiting rarely continues; the bowels are sometimes evacuated unconsciously, generally confined; the urine may accumulate or be passed at long intervals, and the belly is sunk, concave. The attack terminates by a convulsion, or in a coma.

The duration of this form of the disease varies from thirty-six hours to ten or twelve days, rarely so much as the latter; it is much more rapid than most of the other varieties of meningitis.

II. Dr. Monro has described a variety of the disease, which he calls "the most acute species of hydrocephalus," and which differs from the foregoing, especially in its commencement: "It begins," says the professor, "like the croup. The child awakes in the night, in a state of extreme agitation, and much flushed, and with a quick pulse; he is hoarse, and the sound of his voice, when he inspires, is similar to that in croup; the sound seems to come from a brazen tube which is contracted at a certain part."* This croupy breathing, in a case he relates, was changed for asthmatic respiration, and the little patient gradually

* On the Morbid Anatomy of the Brain, p. 70.

gave evidence of cerebral disease—high fever, quick pulse, partial convulsions, dyspnoea, squinting, and insensibility. On dissection, beside serum in the ventricles and spinal canal, and gelatinous effusion on the upper surface of the brain, “the eighth pair of nerves was of a deep, uniform red color along its whole tract, as far as its branches going to the lungs.”* Dr. Monro believes that the peculiarity of this case depended upon the state of the eighth pair, as he has found an analogous condition in patients affected in the same way. Professor Burns has noticed a similar deviation from the ordinary form of hydrocephalus, and attributes it to the same cause. It is very rapid in its progress, and proves fatal in three, four, or five days.

III. The next phase or form of the disease is much more frequent than the first; it is more deliberate in its commencement and progress, though probably not less fatal. The stages, too are much more marked, although the irregularities are so frequent that any arrangement based upon them has but comparatively little value.

The child in this case usually exhibits evidences of deranged health some time before the characteristic symptoms appear. The appetite may have been lost; the tongue is generally whitish, often loaded; the bowels relaxed or constipated, with erratic pains in different regions. Occasionally, there is some complaint of headache, a crick in the neck, or the child in walking is observed to be more feeble on one leg than the other, or to drag one leg. These symptoms may excite little attention at first; but they will be found to be accompanied with disturbed temper, indifference or irritability, languor, pale countenance, occasional chills, and other indications of ill health. In cases where hydrocephalus is secondary to organic diseases of the lungs or intestinal canal, the symptoms of these diseases will mask those of the beginning of the former until their full development.

In ordinary cases, Dr. Gölis thus states the symptoms of turgescence, or of the first stage: “Indifference succeeding to increased sensibility and irritability; a constipated state after habitual looseness or diarrhoea; a scanty, unusually yellow urine, with or without sediment; dryness of the skin, which previously, on the slightest exercise, even on eating and drinking, and particularly during sleep, perspired profusely; sleep without medicine often suddenly occurring in restless children; remarkable gravity and earnestness, which had never been previously noticed. These, taken together with the symptoms, are the signs by which the turgescence of hydrocephalus may with great justice be suspected.”† In the majority of cases, the child complains of headache, or, if an infant, gives signs of it by putting its hands to its head, rolling it uneasily about, and being unable or unwilling to support it. To this succeeds vomiting of ingesta, and of bilious or

* On the Morbid Anatomy of the Brain, p. 70.

† On Water in the Head, p. 15.

greenish matter; the child becomes dull and heavy, complaining of weariness, disliking the light, and sensitive to noise; often in the dark seeing flashes of light, and having the pupils contracted, giving a sharp expression to the eye.

As I have remarked, the tongue is white and loaded, the bowels sometimes free, but often confined; the stools are clay-colored at first, but afterwards of a green color, like chopped spinach, and of a gelatinous consistence, or in some cases resembling tar, and with a peculiar smell, compared by Dr. Cheyne to the "smell of the breath in the beginning of some of the exanthemata." The child sometimes complains of pain in the bowels. The pulse varies a good deal; in some cases, it remains long unaltered, in others it is permanently quick, in others sometimes slow and sometimes quick. Dr. Whytt states, as I have already mentioned, that it is quick in the first stage, irregular, and quick in the second, and intermitting in the third; but Dr. Cheyne seldom observed this regular division. In some cases, no doubt, it exists; in many it is certainly absent.

Thus the disease may go on for some days, without any very marked change, but by degrees we may perceive the child getting worse. Febrile paroxysms are observed, with heat of skin, thirst, quicker pulse, rapid respiration, and a bad smell from the breath.

The countenance becomes altered, thin, and pale, with a peculiar expression, as Sprengel has observed; in some cases, it is œdematous. Portenschlag remarks that the glance, the features and complexion, the voice, the movements, the actions and sentiments of patients in acute hydrocephalus, if they have been known to the physician before the commencement of the disease, are very different to what he remembers in health. The headache and heat of head may continue or diminish; and there may, perhaps, be some delirium, but it is not so loud or violent as in the first species. The vomiting continues, especially in the upright position; the bowels are generally torpid, although we see occasionally an attack of bilious purging; the region of the stomach and liver is often tender on pressure; and the belly is concave and not tumid. The urine is scanty, and frequently voided, generally with sediment; sometimes, as Coindet observed, with a white micaceous sediment.

The senses, which were morbidly sensitive, and the intellect, which may have at first been unusually active, gradually lose their power, and the child becomes dull and stupid. He lies more quietly in bed, throwing his head back, and moving about the legs, and picking his nose and ears, or rather thrusting his fingers into his nostrils or ears. He becomes greatly emaciated, the skin hangs about his arms and legs, the pulse increases in quickness and irregularity, the respiration is more interrupted by sighing, and very decided symptoms of pressure show themselves in the form of twitchings, starting, screaming, and partial or complete convulsions, with insensibility, glazed eye, squinting, &c. The conjunctiva frequently becomes highly injected, with an unusual

puriform secretion; and Dr. Stoben, of Strasburg, has remarked a semilunar yellow speck at the lower margin of the cornea without undue vascularity, but which became an ulcer if the case were protracted. Drs. Cheyne and Gölis remarked, in several instances, a temporary restoration of intellect before death.

This condition may continue for some days, with but little variation, until at length it is terminated by a convulsion or coma.

The duration of this form of disease is greater than the former. Perceval, Fothergill, and Vanhoven say from fourteen to twenty-one days; Gölis from thirteen to twenty-four days; Dr. Cheyne that it is almost always over in three weeks; Dr. Whytt that it lasts four, five, or six weeks. Peter Frank saw a case last six weeks; Drs. Letl and Adelt more than two months.

This form of meningitis, which corresponds with Dr. Cheyne's first species,* will, with some little modification, apply to those cases in which the meningitis occurs in the course of measles, scarlatina, or infantile remittent, or when it is secondary to disease of the bowels or liver. In most cases it terminates fatally, but in cases of recovery Dr. Cheyne remarked the occurrence of large bilious stools, an increased flow of urine, or an abundant perspiration.

IV. Dr. Brockman has described, under the term meningitis encephalica, a species of local meningitis in which the membranes of the pons Varolii and medulla oblongata are chiefly affected. I quote the following description from Dr. Condie's excellent work: "It is sometimes associated with general disease of the brain; at others it is uncomplicated. Notwithstanding in its earlier stages it is unattended by any serious symptoms, it is an affection fully as dangerous as cerebral meningitis. The first stage, or that of simple hyperæmia, generally continues for one or two days. The child is dull and heavy, and the occiput is often hot; the bowels, however, are regular; there is no vomiting, no intolerance of light, nor any disturbance of sleep. The general dulness of the patient, and vague complaints of some uneasy sensation in the head, increase as the inflammatory stage sets in; the heat of the occiput is augmented; the head becomes retracted, as in the ordinary cases of acute meningitis; and convulsive twitchings of the limbs occur, similar to the effects of slight electric shocks, which recur every few minutes while the patient is awake, but cease during sleep. The general febrile symptoms continue during the third stage; the pulse, however, diminishes in frequency and fulness, but does not become either irregular or intermittent. The general disquietude of the child subsides by degrees into a comatose condition, in which the head becomes still more retracted, but unattended with strabismus or any morbid condition of the pupil: the peculiar air of stupidity which characterizes hydrocephalic patients is wanting. Two pathognomonic symptoms, however, indicate

* On Acute Hydrocephalus, p. 2.

the occurrence of the stage of effusion. One of these is deafness, the other is difficult articulation and difficulty in moving the tongue, both of which occur at the same time, probably from paralysis of the motor nerves of the tongue. The deafness and affection of the tongue usually occur suddenly; sometimes they are first observed upon the child awaking from a quiet sleep. They are, according to Dr. Brockman, the earliest and most certain indications of the occurrence of effusion. This stage continues sometimes for three, sometimes for fourteen days. Its termination is in fatal paralysis, the occurrence of which is often preceded by various singular nervous phenomena, as sudden pauses in the respiration, or equally sudden syncope. In some cases, however, the paralysis does not follow, but the anomalous symptoms subside, and the patients gradually recover. Until, indeed, the paralytic stage is fully established, the recovery of the patient is still possible. In the uncomplicated cases of the disease, upon examination after death, the cerebrum in general presents an extremely pallid and anæmic condition, in striking contrast with the cerebellum, the vessels of which are turgid with blood, while its substance also is often in a state of marked hyperæmia. The hyperæmia also increases in intensity towards the central portions of the encephalon; and the membranes covering the pons Varolii and medulla oblongata are found in a most decided state of inflammation: the portion of inflamed membrane is perfectly isolated, and not more, usually, than a square inch in extent; the membrane of the cerebellum being entirely free from any indications of inflammation. There is ordinarily an effusion of a serous fluid into the subarachnoid tissue, sometimes to the extent of several ounces; occasionally a gelatinous matter is effused, and in some instances the effusion is of a purulent character. This form of the disease is most frequently observed in children from three to ten years of age, and who had previously enjoyed good health. The treatment recommended by Dr. Brockman, in its first two stages, is depletion by leeches to the posterior part of the head, cold applications to the scalp, and the free administration of calomel, which latter may be continued during the stage of effusion. Here, however, it becomes necessary to support the strength of the patient; for this purpose ammonia is directed by Dr. Brockman, but he remarks that in some cases the administration of wine may be required. According to his experience, powerful counter-irritants, as a large blister, or the actual cautery, prove also sometimes beneficial.”*

V. The next form I shall describe is the *tubercular or granular meningitis* of the French authors, upon which so much light has recently been thrown. According to Rilliet and Barthez, the progress of the disease corresponds pretty accurately with the three stages of Dr. Whytt; the first characterized by the loss of appetite, paleness, quick pulse

* Condie on Diseases of Children, p. 423.

vomiting, and headache; the second by a slower but irregular pulse, sleep, delirium, and outcries; the third, by acceleration of pulse, paralysis of eyelids, dilated pupils, convulsions, subsultus, &c. Senn and Guersent adopt these three periods: Rufz makes only two, including the two first of Whytt in one; and Piet makes none.

From the researches of late years it would appear that this form of the disease is much more frequent than any other, at least with hospital patients or badly nourished scrofulous children. Rufz, Piet, and Gerhard scarcely met with two cases of simple meningitis to twenty of tubercular; M. Becquerel found one case of simple meningitis in six of hydrocephalus, Barrier four in thirty. M. Guersent observes: "From the observations I have made at the hospital for many successive years, it appears that in children from two to fifteen years the proportion of simple meningitis to tubercular is as two to twelve; after puberty simple meningitis becomes more frequent."*

The disease may attack a child in good health, but it may supervene in the course of some other affection, especially those of a tubercular or scrofulous character. The most common symptoms are headache, attended with vomiting and constipation, and these may be the first to attract attention; but in some cases a series of slighter disturbances have been noticed, especially by German writers, as fantastic desires, caprices, uneasiness, sleepiness, giddiness, uncertain walk, quick pulse. Formey speaks of a fine dry eruption of the color of the skin, milky urine, crossness, irregular walk, nausea, vomiting, &c. I saw one case in which, before cerebral symptoms were very marked, the child was greatly distressed by optical delusions, visions of animals walking before him or around his bed. Restlessness, staring eyes, or semi-rotation of the head are also common, with heat of scalp. The appetite is not always immediately lost, nor is the thirst great until after the eighth day, although the tongue may be dry at an earlier period.

The vomiting is sometimes very slight or not persistent, and the headache in some few cases is less remarkable. The pulse is generally quickened, and the child preserves its intelligence. The strength is but slightly depressed. As the disease advances, the vomiting continues, or perhaps increases, at first of bilious matter or of the food taken; the pulse becomes irregular, whether quick or slow; the child is cross, dull, grinds its teeth, and has a frightened, staring look, evidently distressed by the light. Then the respiration becomes unequal and irregular, with sighing or yawning. The face is sometimes flushed, at others pale, the eye oscillating or turning upwards, the expression of the face that of surprise, or wonder, or indifference, sometimes utterly smooth and without expression, like a wax face.

Now these symptoms may last some time before the more decided symptoms of cerebral disease develop themselves. At length, however,

* Dict. de Méd., vol. xix. p. 411.

a degree of agitation is observed, with some incoherence, either persistent or alternating with intervals of perfect intelligence; an increase of somnolence, or starting, clenching the hands, the thumbs being firmly flexed inwards, and the ankles bent, and convulsions or coma. The convulsion may be general or confined to one side, the other being paralyzed. In some cases the coma comes on very gradually, in others suddenly: the eyes become dull and glazed, the corners of the eyelids encrusted, and the nares dry. The bowels, at first constipated, are afterwards much relaxed, and the stools green and glairy. Occasionally the jaws are firmly closed; the trunk rigid; the pupils dilated, or one dilated and the other contracted; sharp cries are occasionally uttered; the eyes squint, either divergent or convergent; the pulse is small, quick and irregular; the respiration irregular; the skin is covered with cold sweat, the stools and urine are passed involuntarily, and the coma is persistent and constant. Shortly before death the face becomes red or violet, covered with sweat; the eyes hollow and filmy; nares dry and crusted; respiration loud, almost stertorous; pulse smaller and weaker, with occasional convulsions, until death closes the scene.

The duration of this form of disease is pretty much as the last. Rilliet and Barthez have never seen death before the seventh day, but most commonly from the eleventh to the twentieth day; in some cases the patients lived sixty and sixty-seven days. Of 117 cases collected by Dr. Green, thirty-one died before the seventh day; forty-nine before the fourteenth; thirty-one before the twentieth; and six after the twentieth. Of thirty cases noted by Dr. West, the average duration was twenty days and a half; in one, death took place in five days; in ten, before the fourteenth day; in eleven, during the third week; and in three, during the fourth week.*

Although I have given this description of the disease with apparent precision, I should wish to caution my readers against supposing that they will always find the exact series of symptoms here laid down; nothing can be more variable than they are: but, on the other hand, there are always sufficient to show that the brain is the part affected, even in those cases related by Rush, Mills, and others, in which there was neither pain in the head, nausea, dilated pupil, nor strabismus.

Moreover, it must strike every one that between several of the forms here described there is comparatively little difference of symptoms, although their succession and intensity and duration vary a good deal, nor do I think that they will be found more unlike in practice. Every one who has seen much of this fearful disease must have been struck with the general resemblance of all cases, and yet with the infinite variations in minute points, so that it is almost impossible, in a general description, to include even the majority of cases. This must be my

* Lectures in Medical Gazette, August 16, 1847, p. 92.

apology, if one be needed, for apparently multiplying the forms of the disease. I have written partly from my own experience, and partly from the works of others, most of which I have carefully consulted.

VI. The *last form* of the disease which I shall notice has been called the *water stroke*; *wasserschlag*, by the Germans; *apoplexia hydrocephalica*, by Cullen and others; and is described by Gölis,* but omitted by most writers. It consists in a sudden, almost instantaneous, effusion of fluid within the brain, and may occur either idiopathically or as the result of obstructed secretion from some other organ; or as a secondary affection in the course of some other disease, as smallpox, measles, or other febrile eruptions; or on the sudden stoppage of diarrhœa, dysentry, or profuse perspiration.

Though there are evidences of inflammation occasionally found on a *post-mortem* examination, the suddenness and rapidity of the disease prevent the development of the usual symptoms. Those which are to be observed rather correspond to the latter stages of hydrocephalus. The child may go to bed in its ordinary state of health, or suffering from some other disease, and in the morning it may be found dead from a cause which is only detected by a *post-mortem* examination. Or it may suddenly be attacked by a convulsion, followed by paralysis or apparent apoplexy, with insensibility, stertorous breathing, dilated or contracted pupils, and subsultus, terminating in death after a few hours. Almost all, if not all, the patients die, and die too quickly for the employment of remedies.

Pathology.—It is very rarely that any pathological change is discovered in the bones of the cranium; in one case Rilliet and Barthez found some infiltration beneath the pericranium, and the coronal suture contained a small quantity of blood. The head being enlarged, the bones are more or less separated, and the sutures more widely apart than usual.

The dura mater is generally injected; sometimes the sinus is filled with dark blood or gelatinous clots. The cerebral veins contain dark, solid clots.

The arachnoid membrane is frequently injected, either generally or partially,† and in some parts rendered opaque; in other cases it is smooth and polished, but with the products of inflammation in its cavity. Occasionally thick, abundant, and inodorous pus is found, as described by Gölis, Rilliet and Barthez; or the more fluid portion being absorbed, it may lie close upon the serous tissue, and resemble false membrane very much, but it is not smooth, and it breaks up under the

* A Treatise on the Hydrocephalus Acutus, &c., by R. A. Gölis, translated by R. Gooch, M.D., p. 5.

† Piorry, de l'Irritation Encephalique, p. 28.

finger. This disposition may be either general or partial. The most common result, however, is effusion of serum.

The pia mater exhibits similar appearances; purulent matter, more or less fluid, occasionally concrete, and more frequently on its convex surface, in five out of six cases at the base, and varying in quantity in different places. M. Legendre has observed with the microscope that the pus globules are large, round, and transparent, without central nucleus.

The ventricles also often exhibit marks of inflammation; the lining membrane may be vascular and softened, and the fluid contained may be discolored or muddy; occasionally pus, more or less fluid, is found. But more frequently the ventricles are distended, with a limpid fluid resembling serum, but which differs from serum in the proportion of its constituents. Dr. Davis says that it is "a fluid *sui generis*, and is the product exclusively of inflammation of the serous membranes investing the brain, and of the vascular tissues concerned in supplying the encephalon with blood. This is not blood, nor serum, nor purulent matter, nor fibrin, but a fluid already stated *sui generis*."* Berzelius gives the following analysis:—

Albumen,	1·66
Matter soluble in alcohol with lactate of soda,	2·32
Chloride of potassium and sodium,	7·09
Soda,	0·28
Animal matter, insoluble in alcohol,	0·26
Earthy phosphates,	0·09
Water,	988·30
	<hr/>
	1000·00

That is, the serum of the blood, diluted with about seven times its volume of pure water.† The quantity of this fluid varies. Whytt and Gölis state it to be from two to three ounces; Coindet, Bright, and Nasse from one to four or six ounces; Brachet as much as twenty-four ounces; Dr. Copland not more than eight ounces. Sometimes, however, the fluid is nearly absent. Parent-Duchatelet and Martinet state that in eight cases out of twenty-six there was scarcely a trace. Ford and Underwood make a similar observation. In some cases the fluid is present with few, if any, traces of inflammation. These cases, however, are comparatively rare.

Occasionally the central portions of the brain are diseased, softened, and reduced to a mere pulp; when the effusion is considerable, the

* On Hydrocephalus, Preface, p. 10.

† Traité de Chimie, vol. vii., p. 141.

brain has a compressed appearance and the convolutions are flattened. The vessels of the brain are considerably congested.

According to Laennec, Jadelot, Bricheteau, &c., the substance of the brain is very firm, and, as it were, hypertrophied, and in these cases the effusion is slight.

It is very probable that in many cases the membranes of the spinal marrow may participate in the inflammatory action. In one of M. Legendre's cases there was serum containing pus globules underneath the arachnoid, and yellow purulent matter in the meshes of the pia mater; and in six out of thirty cases of convulsions M. Billard found inflammation of the membranes of both brain and spinal marrow.

These *post-mortem* appearances are more or less common to all the forms or varieties of hydrocephalus I have noticed, but others are superadded in *tubercular* meningitis; there we find a peculiar sticky condition of the arachnoid, and in the laminæ of the pia mater a deposition of tubercular matter at different points of the hemispheres, or at the base of the brain. These granulations vary in size, although they are generally small; and sometimes opaline or white, and semi-transparent; in other cases gray and opaque. M. Bouchut states that under the microscope they consist of fibro-plastic elements and of homogeneous amorphous matter, but that he has never seen the transformation of these fibro-plastic granulations into tubercles. His term for the disease, "granular meningitis," is, perhaps, a safer one than that of tubercular meningitis. In most cases we find also secretion of concrete pus, or what appears to be false membrane, on some portion (generally the base) of the pia mater, which is thickened, and greenish or yellowish, friable, and sometimes adherent to the brain. The central portions of the brain, the septum lucidum, &c., are also generally softened, and occasionally there is tubercular deposition in the substance of the brain and in other organs.

"I found in the water-stroke," says Gölis, "the brain commonly firmer than in the acute hydrocephalus; also the bloodvessels of the brain and its membranes less enlarged and less turgid than in the latter," and "from two to four or six ounces of turbid fluid."

Morbid changes in other organs are rare in any of the varieties, except when the meningeal affection is secondary. In such cases we may find inflammation or ulceration of the mucous membrane of the stomach and bowels, evidences of follicular enteritis, &c. Dr. Cheyne mentions that he found in many cases proofs of increased arterial action on the surface of the liver, that it was adherent to the peritoneum, enlarged, and studded with tubercles.

M. Rilliet states that in general meningitis and meningitis of the convexity, tubercles in the lungs or abdominal organs are never met with, but that in meningitis of the base alone they are; and we know that in tubercular meningitis they are uncommon in the lungs, &c.

From this short statement of the morbid appearances discovered on a

post-mortem examination, we may come to some conclusions as to the nature of the disease. With some exceptions, in which we find merely a collection of fluid, in each form we find traces of inflammation in the membranes of the brain, with its results in the form of serum, or pus, or lymph. In a large class of cases, in addition to evidences of inflammation of the membranes and certain changes in portions of the brain itself, we have a deposition of tubercular matter, but whether the latter be the consequence of inflammation seems hardly decided as yet. Mr. Trousseau believes it to be so, but Rilliet and Barthez incline to the opposite view. M. Bouchut considers it a constitutional affection. I may quote the conclusions at which Dr. J. R. Bennet has arrived, although I do not quite concur with his comparative estimate. "1. That in many instances the disease consists simply in *inflammation of the brain and its membranes*; the symptoms and the *post-mortem* appearances varying according as the inflammatory action is seated primarily in the substances of the brain or in the meninges, and according as it is more acute or chronic; and that in some of the more acute forms, rapidly terminating in death, little or no effusion may be found. 2. That in by far the largest class of cases, the disease is essentially the *result of scrofulous action*, and may or may not be attended by the signs of inflammation: that the most characteristic lesions in these cases are the softening of the central parts of the brain and the effusion of serum; but that meningitis, chiefly of the base, is a very frequent secondary lesion, and is usually of a manifestly strumous character, and that therefore in this the largest and most fatal class, acute hydrocephalus is but a modification of scrofulous disease. 3. That there are cases, from their symptoms hardly to be distinguished from the last class, in which effusion into the ventricles is the only morbid appearance to be met with after death; and that in these instances, the essence of the disease appears to consist in some alteration in the condition of the nervous matter, probably allied to irritation and that they may therefore be said to constitute a purely *nervous variety* of hydrocephalus. 4. That there is a class of cases distinct from the above, but closely allied to them, which may generally be traced to some source of exhaustion, either direct or indirect, in which the *post-mortem* appearances are generally indistinct and of a trifling kind, consisting for the most part of some degree of congestion of the large vessels and a little effusion of serum: and that in some of these cases, the effusion has probably resulted from injudicious treatment had recourse to with a view to cure an imaginary inflammation: these being the cases described by Dr. M. Hall, and others, under the designation of hydrocephaloid disease."*

Causes.—Age appears to have considerable influence in predisposing to the disease, and this we should expect from the susceptibility of the brain during its growth. Certainly in these countries it is much more

* On Acute Hydrocephalus, p. 156.

frequent during the first six years of life than afterwards. It is chiefly during infancy that the first or second forms I have described, are seen; tubercular meningitis occurs both during infancy and up to ten or twelve years of age.

Drs. Percival and Coindet found it most frequent between the ages of two and seven years; and Dr. Emerson, of Philadelphia, found that out of 1603 cases, 1395 occurred before the fifth year, or between the ages of five and ten. Dr. Green found it more frequent between the ages of five and seven.

There is some little difference in the liability of the two sexes; rather more males than females are attacked during the first six years, and fully as many females, or perhaps more, for some years subsequently. Afterwards three times as many men as women are attacked, according to Parent-Duchatelet.

The disease is more frequent in some countries than in others. Dr. Cheyne considers it more frequent in Scotland than in Ireland, and in summer than winter. I cannot, of course, say how frequent it may be in Scotland, but I have reason to believe it very frequent in this city. Dr. Stewart mentions that it is a frequent disease in America; Camper and Tissot that it is rare in Holland and Switzerland. Guersent states that tubercular meningitis is more common in summer or autumn; Piet that it occurs more frequently in March and July. Rilliet and Barthez are doubtful whether the season makes any difference.

There can be little doubt that the disease is hereditary, especially tubercular meningitis, and we frequently see several children of the same family successively cut off by it; this has been noticed by almost all writers, Sauvage, Ludwig, Cheyne, Odier, Formey, Gölis, Bouchut, &c. Dr. West mentions that "in sixteen out of twenty cases in which the health of the relatives was made the subject of special inquiry, it was ascertained that either the father, mother, aunt, or uncle, had died of phthisis."

Something also may be attributed to the constitution of the child. No doubt children of good constitution, and in perfect health, may be attacked by any form of the disease: but certainly those of leucophlegmatic habit, or tainted with scrofula, are especially liable; and where there is any disposition to scrofulous tubercle, it will favor the production of tubercular meningitis. In a large proportion of cases Dr. Mills found unequivocal appearances of scrofula; and eleven out of twenty-two cases observed by Dr. Percival were "decidedly scrofulous." It is a common opinion that a certain form of the head predisposes to this disease, but I have carefully watched children with large heads and prominent foreheads without finding sufficient grounds for the belief.

An attack, described as acute hydrocephalus by Dr. Albert,* is said to have prevailed as an epidemic from March to May, 1825. During

* Hufeland's Journal du Prat. Heilkunde, Aug., 1830.

this period more than 150 infants were attacked, and twenty-eight of them treated by Dr. Albert. The disease commenced by shivering; followed by heat, intense headache, vomiting, constipation, scanty urine, epigastric tenderness, &c. The child was constantly rolling the head about, the sleep was broken by starting and cries, there was delirium, oscillation of the eyeballs, and automatic movements of the extremities. The face was pale, the tongue white or brown, the mouth and nares dry, the conjunctiva injected, and the eyes intolerant of light. Afterwards the child lay still, unable to support the head, the face changed, the eyes sunk and turned upwards, the hand raised to the head, respiration labored, with deep sighs, sordes on the tongue and mouth, emaciation increasing, and the pulse small and quick generally, but occasionally slow. From this state very few recovered. I may add that it occurred as an epidemic in 1840, 1841, and 1842, among the conscripts at Versailles, Lyons, Metz, Strasburg, Avignon, Nantz, and Poitiers.

More recently it has appeared epidemically in this country, at first at Bray, Co. Wicklow, in January, 1846; in the South Dublin Workhouse in the following months; and in April and May in the Belfast Workhouse (as we find from a valuable paper by Dr. Mayne); attacking chiefly boys under twelve years of age, and proving rapidly fatal, in some cases in fifteen hours, in others in forty-eight hours, in the greater number in four days, whilst in some it was prolonged a fortnight or three weeks. There were no premonitory symptoms; it sometimes commenced by pain in the abdomen, followed by vomiting, and subsequently by purging; at this time the patients had all the appearance of collapse, then followed reaction, fever, quick pulse, rigidity of the muscles, those of the neck in particular, with a tetanic expression of face. Soon after several general convulsions occurred, or a semicomatose condition supervened, with grinding of the teeth and crying incessantly. Towards the close, this state merged into coma, with the pulse slow and labored, failure of power of speech and deglutition, and involuntary evacuations.*

An epidemic also occurred in Milbury and Sutton, U. S., and has been recorded by Dr. Jos. Sargent, of Worcester.† Of 16 cases, scarcely one recovered. Death took place from the 6th to the 13th day. It was not, however, confined to children, and it is remarkable that in several cases there occurred petechiæ over the body. The appearances I have described presented themselves on *post-mortem* examination, with the exception of the deposition of tubercular matter.

Among the *exciting* causes may be enumerated milk that disagrees with the child, mental distress in the mother or nurse, of which I have

* Dublin Quarterly Journal of Medical Science, Aug., 1846, p. 95.

† American Journal of Medical Science, July, 1849, p. 35.

seen several examples, prolonged lactation,* indigestible food, the sudden suppression of an eruption on the head, retrocession of febrile eruptions, dentition, exposure to the heat of the sun, fright, anger, cold, blows or falls on the head. Gölis mentions that children born immediately after the bombardment of Vienna, in 1809, were shortly seized with convulsions, and died: within the cranium were found traces of inflammation, and effusion of lymph and serum in the ventricles.

Sir H. Halford and Dr. Abercrombie mention suppressed secretion of the kidneys as one cause.

Lastly, either variety may occur as a secondary disease to some other affection. Thus we may observe meningitis in the course of infantile remittent fever, towards the termination of measles, or scarlatina, or hooping-cough; after a severe bowel complaint (gastro-enteritis, follicular enteritis, cholera infantum) or diseases of the liver, as stated by Harris, Curry, Yeates, Thompson, Cheyne, &c.†

It is occasionally, but rarely, connected with bronchitis,‡ pneumonia, and phthisis.

I ought to observe that in these secondary attacks there is some little difference in the symptoms: there is generally less headache and fewer premonitory symptoms; the attack seems to come on more suddenly, often by convulsions, and the duration is less prolonged.

Diagnosis.—The most characteristic symptoms of the first stage, according to Dr. Mills, are, “the peculiar expression of countenance indicative of oppression, pain, and despondency; frequent sighing; a disposition to retirement; a heat, weight, pain, or heaviness of the head, or all these combined; waywardness and fretfulness; a low, irregular fever; frequent nausea or retching; an irregular state of the appetite and bowels, and the continuance of the diarrhæa,” notwithstanding the remedies. The second stage is marked by “the heavy sigh, the deep moan, the wild scream, the preternatural dilatation or contraction of the pupils, imperfect or lost vision, delirium, difficult deglutition, paralysis of one hand, arm, or leg, and of the sphincters; the head permanently bent back; a slow intermitting, or rapid pulse; frequent vomiting, or convulsions.”§ M. Trousseau has pointed out two symptoms of importance in the diagnosis of meningitis; one is a peculiar suspirious breathing, and the other a redness of the skin produced by the slightest friction. The former is very remarkable; the

* Observations on the healthy and diseased Condition of the Breast, Milk, &c., by Ed. Morton, M. D., p. 24.

† Cheyne on Hydrocephalus, p. 49. Piorry de l'Irritation Encephal., p. 52. Gölis, p. 71. Eberle on Diseases of Children, p. 328.

‡ Mills, Trans. of Association, vol. v. p. 361.

§ Transactions of Association of College of Physicians in Ireland, vol. v. p. 446.

the child takes a long breath, and then remains without breathing for an irregular period of from ten to fifty seconds. I have repeatedly observed this occurrence, although not so constantly as M. Trousseau. The cutaneous phenomenon exhibits itself several days before death, and is produced even by a slight pressure of the finger: it does not appear to be connected with febrile action, as it is absent in many children who have high fever. There are not many diseases likely to be permanently mistaken for meningitis, nor can we easily confound a well-marked case of the latter with another disease; but in their commencement some diseases do exhibit somewhat similar symptoms, and some cases of meningitis terminate like other diseases.

1. In *cerebral congestion* we have a marked series of head symptoms not unlike the commencement of hydrocephalus; there is sleep, stupor, even coma, with agitation of the limbs, or rigidity, sometimes partial paralysis; the face sometimes flushed, or unaltered, or spasmodically twisted; the pupils, perhaps, dilated: pulse quick, &c. Now as meningitis may be accompanied with cerebral congestion, it is not always easy or possible to draw an accurate distinction at first; but as the disease advances, especially if it be prolonged, we shall find considerable difference. In meningitis there is less stupor, coma does not come on until late; convulsions generally occur; the respiration and pulse are more irregular; the face has a sunken look; and the disease is more prolonged.

2. *Eruptive Fevers*.—As these sometimes commence by convulsions and headache, with quick pulse, we may for a while be in doubt, but there is seldom more than one or two convulsions in such cases, and in a short time the appearance of the eruption will decide the question: the delay is of no consequence, as the treatment, so far as the head symptoms are concerned, must be similar.

3. *Infantile remittent* or *gastric fever* seldom presents sufficiently marked head symptoms, at the beginning, to be mistaken for hydrocephalus, but towards its termination, especially when there is follicular ulceration, the aspect of the case is very similar. The stupor and insensibility, however, are never so complete; remissions almost always occur; the head is often cool; the headache is not so acute; there is great emaciation, but not that drawn look about the face, or its peculiar expression, or the concave condition of the belly, which is generally tumid; and we rarely have convulsions or paralysis, or even the twitchings, startings, and screams; moreover, it is rare in children under four or five years of age. Of course, these observations do not apply to those cases of infantile remittent which run on into hydrocephalus.

4. Gölis considers the difference between hydrocephalus and *typhus* fever to be marked by the shorter duration of the period of turgescence in the former, the less frequent pulse in the early period, and its irregularity in the latter; the marked stages; the greater sensibility of the

eye and ear; the interrupted respiration; the emaciation, and the fallen state of the belly, &c.

5. The fourth variety, or water-stroke, may very likely be mistaken for *apoplexy*, but the history of the disease, the age of the patient, &c., will correct this opinion, unless we choose to regard it as a variety of the serous apoplexy of authors, the symptoms being very similar.

6. An attempt has been made to distinguish between simple acute meningitis and tubercular meningitis, but I confess I do not think this easy, except in extreme cases. Certainly those cases of the former which commence with high fever, delirium, convulsions, and terminate fatally in two or three days, do differ widely from the gradual development and slower progress of the latter; but these cases are by no means the most common, and in the majority of cases the course and symptoms are so similar, that unless we have some collateral circumstances to guide us (as, for instance, a disposition to tuberculosis in other localities, or a strongly marked scrofulous diathesis), I should not feel much confidence in a positive diagnosis. The principal grounds of distinction laid down by M. Rilliet, are: 1. That tubercular meningitis occurs in delicate, often precocious children, and in those subject to glandular enlargements and chronic eruptions of the skin; whereas in simple meningitis, the subjects are vigorous, well developed, and healthy. 2. That the former disease is always sporadic. 3. That the child previously pines away, and suffers from disorder of the stomach and bowels. 4. That tubercular meningitis never commences by convulsions, and that the transition from the first to the second stage is insensible, the advent of the latter being marked by headache, vomiting, and constipation. 5. That the headache is more intense, vomiting not so urgent, constipation obstinate, and fever moderate. 6. That the progress is slow; and 7. That its duration is more prolonged.

Prognosis.—Every form of the disease is extremely fatal; very little chance remains for the patient, if the first stage, as we may call it, be neglected. Rilliet and Barthez state that they have never seen a single case of tubercular meningitis cured, and in this they only confirm the testimony of Rufz, Piet, Gerhard, &c.

On the other hand, Henri states that he cured thirty cases, Odier four out of six, Gölis forty-one, and Formey nearly all to whom he was called at an early period of the disease. Guersent admits that tubercular meningitis may be cured during the first period, but not one per cent. at a more advanced stage;* nor is Dr. West's opinion more favorable. Drs. Perceval and Whytt give one case of cure. Dr. Cheyne mentions three cases of cure. M. Piorry relates fourteen cases, nine of which recovered. Various cases of recovery may be

* Dict. de Méd., vol. xix. p. 403.

found scattered through the periodicals, such as those by Thompson,* Uwins,† Watson,‡ Heinekin,§ in the older Journals, and more recently in the pages of the *Edinburgh Journal*, *Lancet*, *Medical Gazette*, &c. &c. I have no doubt that all, or nearly all, must have been in the early stage. The fourth variety, or water-stroke, always ends fatally.

I have seen a considerable number of cases, and although when symptoms of effusion are present the case is hopeless, yet at an earlier period I have succeeded in curing a much larger proportion than one might have expected, considering the importance of the organ affected, and the severity of the disease.

Terminations.—Some German writers have related cases where acute hydrocephalus terminated by a critical discharge. Meissner mentions one case in which epistaxis occurred, and another in which there was a copious serous discharge from the eyes, with considerable mitigation of the symptoms, and a third who recovered after a similar evacuation. Tortual observed the discharge of serum from the nose, and Riecke from the right ear. Jahn mentions the case of an infant in whom effusion had taken place, but who was cured after a discharge from the ears and eyes. Nasse, Cheyne, &c., enumerate other critical evacuations, such as profuse sweating, excessive secretion of urine, eruptions on the face, &c.

The favorable signs which give hope of recovery after judicious treatment are, the occurrence of tranquil sleep, the diminution of the startings, the pulse becoming slower, the eyes more steady and less sensitive to light, and the expression of the face more natural and calm.

On the other hand, the rapid, small pulse; quick, irregular respiration; dry, furred tongue; livid face; injected conjunctiva; glazed eyes; increase of the startings and twitchings; disturbed sleep; wakefulness, or coma, all announce a fatal termination.

In some cases, but very rarely, the severe symptoms are mitigated, and the disease subsides down into chronic hydrocephalus, as in a case of Dr. Monro's; and probably this may be favored in young infants by the distensibility of the cranium, for certainly symptoms of compression are more marked in children whose sutures are ossified than in very young infants.

Treatment.—Believing, as I do, that hydrocephalus consists essentially in inflammation of the membranes of the brain, with or without deposition of tubercular matter, and agreeing with Dr. Davis, that, when attacked early, a considerable proportion of cases may be cured,

* Lond. Med. Repository, Jan. 1814.

† Med. and Phys. Journal, Aug. 1816.

‡ Lond. Med. Repository, Feb. 1816.

§ Ibid., Sept. 1819.

I cannot too strongly express my sense of the importance of early and vigorous treatment. I am convinced that many children are lost by the usual moderate remedies, who might be saved if more active measures were adopted. Let me illustrate what I mean by a case. My friend, Dr. M'Donnell's child, aged four months, strong and healthy, was suddenly attacked by acute meningitis of the most severe character. Six leeches were applied immediately to the forehead, and the bleeding stopped; the convulsions became less frequent, and the fever diminished; in about eight hours six leeches were again applied, and we found that the convulsions did not return, but the starting, and crying and restlessness continued; and consequently after the lapse of six or eight hours we repeated the six leeches, *i. e.*, eighteen in twenty-four hours, stopping the bleeding as soon as the leeches fell, and from that moment all the symptoms rapidly subsided, and the child recovered his health in two or three weeks.

But, of course, one rule will not apply to all cases. Many things must be taken into consideration; first, the constitution of the child; secondly, the cause and character of the disease; thirdly, whether the disease be primary or secondary; and, lastly, the period of the attack at which we are called to the child. These circumstances will necessarily modify the treatment. You cannot bleed a child of a weak constitution so extensively as one who is strong and healthy; nor does the disease, when secondary, or in an advanced stage, admit of such active treatment. Let us examine the principal remedial agents in use.

Bloodletting.—In all forms of the disease, whatever be the constitution of the child, whether the disease be primary or secondary, *if the attack be recent*, I believe bloodletting to be necessary, either by opening the jugular vein or the vein in the arm, by cupping, or by leeching. And the quantity taken should be in most cases larger than in other diseases, or even large in proportion to the age of the child. Moreover, if the good effect be not produced, and the child be able to bear it, it should be repeated three or four times; but, if leeches are used, the wounds should not be allowed to bleed after the leeches have fallen. M. Piorry says: "I believe, then, that we ought to bleed, especially during the period of congestion; that twenty, thirty, forty leeches, or even more, should be applied, or that one or more venesections should be practised—in a word, that we ought to act promptly and energetically."* Dr. Mills recommends venesection first, and then leeching. Dr. Davis recommends that the first bleeding, if we are called early, should be carried to actual fainting—"not to faintishness, but full fainting."† It is only right to state that Dr. Rush, of Philadelphia, was one of the first, if not the first, to recommend large bleeding in this disease.

* De l'Irritation Encephalique, p. 58.

† On Acute Hydrocephalus, p. 241.

But if the child be weak, or if the disease be secondary, the amount of bleeding must be less ; and I think it better to produce an effect at once than to repeat small bleedings, after which we must depend upon remedies to be noticed presently. Dr. Cheyne remarks of such cases as those he has described : "In most cases, local bleeding by leeches or cupping, or general bloodletting from the external jugular vein or temporal artery, according to the state of the pulse and strength of the patient, must be practised." "But I am convinced that bloodletting, unless in very robust constitutions, is not always to be repeated without danger." These cases answer to those I have made the second variety of the disease. In the first variety, Dr. Cheyne approves of ample and repeated bloodletting.

In tubercular meningitis, bloodletting is also necessary, according to the age and strength of the patient and the intensity of the disease ; but Rilliet and Barthéz do not think it should be carried to so great an extent as in simple acute meningitis. In the more advanced stage of either variety, it is rarely of any use, and may perhaps do injury by reducing the strength of the child.

In the first stage, M. Rilliet advises leeching, mercury, purgatives, and counter-irritants ; if it be in the second stage, calomel, mercurial and iodine ointment, mustard cataplasms, and cold lotions to the head ; if in the third stage, cold applications to the head, mercurial or iodine frictions, suspension of the calomel if there be diarrhœa, and mustard cataplasms. When a child of strumous habit is threatened with meningitis, or is seized suddenly with some of its symptoms, he prescribes the treatment for tubercularization in general, as iodine and ferruginous preparations, iodine frictions to the head, cod-liver oil, exercise in the open air with the head uncovered, but not exposed to the perpendicular rays of the sun.

Cold applications may be employed by means of lint dipped in cold lotion, or, the head being wet with an evaporating lotion, a current of air may be directed upon the head. This I have found of great value and a great comfort to the patient. Or a bladder, or a water-tight bag may be partially filled with powdered ice, and allowed, when spread out, to rest lightly upon the head. The hair should be removed as completely as possible before applying the cold. All writers are agreed as to the value of this remedy, which should be employed as early as possible, and continued until the symptoms have subsided, or nearly so. Heine, Formey, Foville, and Piorry recommend affusion with iced water ; but to this Piet, Senn, and Carpentier are opposed.

Counter-irritation by means of sinapisms or mustard baths to the legs, blisters behind the ears or upon the head, is of great value, and ought in all cases to follow the bleeding. In those cases in which the bleeding or its repetition is inadmissible, our main dependence must be upon counter-irritation and mercury.

I think that a repetition of smaller blisters has more effect than one large one. I generally commence by blistering the forehead, and,

when that begins to heal, apply another over part of the top of the head, and so by degrees irritate the whole of the scalp. This appears preferable to keeping a blister open for any length of time.

Dr. Cheyne recommends that they should be dressed with mercurial ointment, so as to aid in bringing on mercurial action.

Frictions to the head with tartar emetic are spoken well of by Gölis.

If, when the child is recovering, the head symptoms do not disappear completely and satisfactorily, great benefit will be derived from a seton of three or four silk threads in the arm, which may be removed when the child is perfectly well.

Mercury, we have seen, was successful in one of the first cases of cure on record, that published by Dr. Dobson in 1775; and since his time it has steadily maintained its ground as one of the most important remedies we possess. In every form of the disease its use may be commenced immediately, except in the cases preceded or accompanied by diarrhœa. The bowels must be quieted, at least before we can give it internally; but should the intestinal irritation persist, we may still use inunction with the ointment and liniment of mercury.

It is better to give calomel, or hyd. c. cretâ, in small doses, pretty frequently, than in large ones, as being less likely to disorder the bowels, and it may be continued until the mouth is tender; but it must be remembered that it is not easy to salivate a child, and I have found that mercurial diarrhœa is a tolerable proof of the constitution being affected. Whytt, Odier, Quin, Wilmer, and others, gave it in doses of two, three, or more grains at a time, and continued it for many days, notwithstanding any effects on the intestinal canal; but I quite agree with the following observations of Gölis: "In little children of from one to four or five months, a quarter of a grain—in larger, of from six months to one or two years, half a grain of calomel—given internally every second hour, will be sufficient, until it has produced green slimy stools four or six times, but not purging stools, against which Perceval has already warned us; or until there occur sharp pains in the belly, which infants express by drawing up their legs, and whining, but larger children describe with words."*

I have already mentioned that if diarrhœa be present it will require attention, and not merely on account of the impossibility of giving mercury internally whilst it continues, but because of the constitutional and cerebral irritation which it occasions. And in those cases where the bowels are torpid, we must have recourse to *purgative* medicines, which benefit by emptying the bowels, and act as derivatives also. A brisk mercurial purgative in such cases should be given at once, and repeated if necessary. Neither are we to conclude, in all cases of diarrhœa, that purgatives are unnecessary; in many instances there

* On Hydrocephalus, p. 111.

are accumulations in the bowels which must be removed before relief can be obtained, but in such cases I think it better to quiet the irritation first, and then give purgatives. So long as the stomach is irritable, enemata must supply the place of ordinary purgatives, but they do not sufficiently clear out the bowels.

Dr. Davis strongly recommends the administration of an *emetic* after bloodletting for the purpose of controlling the action of the heart and arteries; he prescribes one-fourth or one-fifth of a grain of tartar emetic with five grains of powdered ipecacuanha. Laennec had previously found great benefit from tartar emetic, but I am not aware that he gave it so as to produce more than nausea.

I have never tried the effect of emetics, nor do I think it would be wise. Vomiting for the time increases cerebral congestion, which would be injurious; and in many cases an emetic would be unnecessary, because vomiting is already present, and yet we never find that it does good. There may however be another reason for giving small doses of tartar emetic. If it be combined with the calomel, it has been found to quicken the action of the latter and to save time. I am indebted to my friend Dr. Aquilla Smith for this suggestion.

Drs. Cheyne and Stoker think very highly of *James's powder* in full doses at the commencement of the disease, and the former mentions a case apparently cured by it. Certainly in combination with calomel it seems to act beneficially, but I should be very sorry to depend upon it alone.

Digitalis alone or in combination with calomel, has been recommended by many writers, particularly by Weaver and Formey. Dr. Cheyne found it of great use in two cases; others with whom he had tried it were too far advanced in the disease. Gölis says that he has used it for sixteen years, and in several hundred cases, but without any great advantage; the dose he recommends is one-eighth of a grain of the powder with half a grain of calomel every two hours.

Very great difference of opinion exists as to whether *opium* is at all admissible in this disease. Cheyne thinks it useful, joined with an aromatic, in correcting bilious vomiting and purging. Gölis is entirely opposed to it. Mills speaks favorably of it combined with the calomel. Hood strongly recommends it.* No doubt it requires great caution because of its effect upon the brain, but I have used it with great benefit in the cases commencing with severe diarrhoea, and without any injurious consequences.

Iodine has been used, and it is said with benefit. Dr. Evanson is favorable to its employment, and Rilliet and others strongly recommend it. Dr. Roser tried the hydriodate of potash and recommends it when other remedies have failed, and even when paralysis has occurred. He dissolves a drachm of the hydriodate in half an ounce of water,

* On the Fatal Diseases of Children, p. 192.

and gives thirty drops of the solution in water every hour.* Mr. Flinder, of Lymington, has related three cases of hydrocephalus in the advanced stage treated successfully by half a grain of the hydriodate of potash every two hours. The only apparent effects of the medicine were diuresis and salivation.† So far as they go, these cases are encouraging. I have not seen such good effects from its use, but I certainly think it deserving of a more extended trial.

Phosphorus has been strongly recommended by M. Coindet, in combination with three parts of oil of almonds. It is a very uncertain medicine, and one which may do mischief, and will require great care.

Various *antispasmodics*, such as valerian, arnica, camphor, musk, and castor, have been employed, but very little reliance can be placed upon them.

When the symptoms are somewhat mitigated, or the disease is prolonged, and assumes a remittent character, Piorry and H. Cloquet recommend *quinine* as having been successful in saving several cases. During convalescence it is undoubtedly of great value.

I need hardly add, that all possible sources of irritation must be removed as speedily as possible; if the child be teething, the gums must be completely divided all round and across; and if the attack be secondary, our most vigilant efforts must be directed to the mitigation or removal of the primary disease. If there be the slightest suspicion that the mother's or nurses's milk does not agree with the child (when at the breast), we should instantly change it, and choose a new and healthy nurse, whose milk is a little older than the patient, if diarrhoea be present. The mother may be unhealthy, or if healthy, she may be suffering from distress, which is quite sufficient, as I can testify, to cause hydrocephalus.

The diet of the child must be restricted during the first two periods, and should consist of little more than milk and water, with panada. As the disease advances, we must gradually endeavour to support the strength; and, if the termination be favorable, it will need care and caution to give sufficient food without excess. A spoonful of chicken broth may then be given two, three, or four times a day, and increased as the child can bear it. Wine whey will also be found very useful, and ultimately solid food and wine and water, if the child be old enough.

But far more important than the diet is it to take measures to insure absolute quiet and soothing rest for the excited brain. The room should be darkened, the air kept fresh and cool, only the necessary attendants admitted, and absolute silence enjoined as far as possible. When taken out of the cradle or bed, the infant must lie on the lap or in the arms; and, when moving him or walking about with him, the

* Hufeland's Journal, April, 1840.

† Med. Gazette, Sep. 30, 1842.

movements should be as gentle and equable as possible. Even when recovering, all excitement, noise, and merriment should be avoided as much as sharp air after pneumonia.

Thus, in the first and second stages of meningitis, our remedies are: bloodletting in proportion to the age, strength, and constitution of the child, and the intensity of the attack, but in greater proportion than in other diseases; cold applications, counter-irritation, purgatives, if the bowels are confined; soothing and astringent medicines, if there be diarrhoea; calomel and James's powder; digitalis.

In the third stage, a continuance of the calomel, hydriodate of potash, cold applications, iodine frictions, or repeated blistering of the head, are nearly all that we can do with any prospect of benefit.

Lastly, most anxious inquiries are made of us by parents who have lost one child from hydrocephalus as to the best mode of preventing the disease in others. We have no medicine which will do this; but, nevertheless, much may be done by good care and judicious management. If the child be very young, the mother had better not nurse the child. A change of milk will do much towards changing the constitution. The bowels should be carefully watched, and any deviations from health corrected; the gums should be lanced freely, the moment there are any signs of irritation: and the child should neither be exposed to heat nor cold.

As the child grows older, he should be kept much in the country and in the open air, be encouraged in running and jumping, and the ordinary outdoor amusements of children; but climbing, and many of the exercises of the gymnasium, particularly those which require the head to be held down, should be avoided. A good shower-bath, or general sponging with cold water, every morning, is an excellent thing. The more healthy the skin, and the more developed the muscles, the less fear there need be for the brain.

Again, in children with the least predisposition to the disease, the education should be carried on very cautiously; the attention should only be occupied for a short time together, the memory not overburdened, and every species of intellectual excitement avoided. Let the brain acquire strength before any burden be laid upon it. The sensibility should also be moderated, and passion controlled, not by indulgence, but by a mixture of reason and authority. The diet should be nutritious, but unstimulating, and the bowels should be kept in order.

Should the slightest symptoms show themselves, notwithstanding our care, Odier, Quin, and Matthey recommend the application of a blister; and Dr. Sasche succeeded by means of an issue in preserving a child whose brothers and sisters had died of the disease. I have great faith in the benefit to be derived from an issue (three or four threads are enough), from having witnessed the good effects in several cases.

CHAPTER VII.

CHRONIC HYDROCEPHALUS.

THE chronic form of hydrocephalus is much more rare than the acute, still we meet with the disease occasionally in children of different ages, from birth up to puberty. I have already spoken of hydrocephalus as occurring during intra-uterine life, and I may add that even of those which occur after birth, there is good ground for believing that many commenced during intra-uterine life.

Chronic hydrocephalus may be divided into two species, the *congenital*, including those, the cases of which can be traced back to birth or previously, and *acquired*.

1. *Congenital Hydrocephalus*.—This may co-exist with a head less than usual, of the natural size, or of increased volume. Bouchut considers the second case more frequent than the first, but Dr. Battersby denies this, and states the first is always congenital. “Most frequently children with a head of diminished size have at their birth the fontanelles closed, and the sutures ossified. Most of these children die as soon as they are born, or perish in convulsions a very short time after birth. They are absolutely deprived of intellectual faculties, and their senses are obliterated. The head of these little ones is constantly pointed at its summit, and depressed laterally towards the ears. The forehead is also flattened, and the head covered with thick hair. The eyes are constantly convulsed, they rotate, and are insensible to the light; the pupil is much dilated, and in some cases the iris has appeared to adhere to the cornea. The face, without any expression, is the image of stupidity. The voracity of these children is great, yet nutrition is badly performed: liquids are swallowed with great difficulty; they lose their breath, and excite fears for their suffocation. The stools and urine are discharged involuntarily. The voice is a feeble and hoarse sound. The feet are crossed immovably; the thighs are flexed on the abdomen. These unfortunates can never stand nor walk. Their extremities are cold. They appear to have only a vegetative existence; they never exhibit a spark of reason, and are one of the saddest pictures of humanity.”* To this form of disease, Cruveilhier proposes to apply the term *microcephalus*, and he divides it into three varieties: 1. With

* Battersby's Essay, Edin. Med. and Surg. Journal, Jan. 1851. In rewriting this chapter, I have availed myself very freely of Dr. Battersby's able and learned papers, in which are collected nearly, if not all the facts on the subject, and in which the different points are investigated with great care and acuteness.

atrophy of the brain. 2. With serous effusion into the cavity of the cranium; and 3. Where there is atonic atrophy and effusion.*

Cases of hydrocephalus with the head of the natural size or unusually small are related by Mr. Ward† and Dr. Battersby.

Hydrocephalus with an enlarged head is undoubtedly the most frequent; there may be no evidence of the disease at birth, or so slight that it excites no attention, and yet the morbid cause may be, or may have been some time at work, and the case strictly one of congenital hydrocephalus.‡ Barrier remarks that although at birth the head may not be unusually large, yet as the functions of innervation are too feebly developed to suffer much disturbance from a slight cause, there may be more fluid than usual within the cranium without our being able to detect it.§

2. *Acquired chronic hydrocephalus*, as Barrier observes, is sometimes, though rarely essential, idiopathic, and analogous to other essential dropsies; at other times it is symptomatic of another disease. The most common disease giving rise to it is tubercle in the brain, or a cancerous or other tumor. Such cases are mentioned in the works of Bonetus, Morgagni, Lieutaud, and Portal. Lallemand, John Hunter, Danz, and Constant, mention tumors of the cerebellum with fluid in the ventricles; but they do not state whether there was compression of the straight sinus. Majendie attributes hydrocephalus, among other causes, to an obstruction to the flow of the cerebro-spinal fluid through the ventricles, and has given cases of hydrocephalus with compression of the fourth ventricle by a tubercle of the cerebellum; by an aqueous tumor upon the aqueduct of Sylvius, the valve of Vieussens, and the fourth ventricle, and also by compression made upon the mesocephalon and the fourth ventricle by an exostosis of the basilar portion of the occipital bone. He also alludes to cases of hydrocephalus with compression of the fourth ventricle by a fibrous tumor, developed in the valve of Vieussens, or by tumors of different kinds seated in the annular protuberance.||

Barrier gives three cases of hydrocephalus from compression of the straight sinus, in children aged 3, $4\frac{1}{2}$, and 5 years. He conceives that the anatomical conditions of this form of hydrocephalus are, 1. That the tuberculous tumor should occupy the middle lobe of the cerebellum. 2. That it should make superiorly a projection sufficiently considerable to throw up the tentorium cerebelli, and to compress the straight sinus.¶

* Anat. Path., livr. 3, p. 4.

† London Med. Gaz., March 27, 1846.

‡ Bouchut, Mal. des Nouveaux Nés, p. 450.

§ Mal. de l'Enfance, vol. ii., p. 585.

|| Sur le Fluide Cephalo-rachidienne, p. 74.

¶ Mal. de l'Enfance, vol. ii., pp. 594, 603.

Rilliet and Barthez agree with M. Barrier that compression of the *venæ galenæ*, or straight sinus, whether by a tumor in the neighbourhood or by an obstruction in the cavity of the sinus, or by its obliteration, as related by Tonnellè,* is the most frequent cause.

Dr. Whytt relates a case in which a scirrhus tumor, occupying the situation of the pituitary gland, by compressing the neighbouring veins, gave rise to effusion.

Hemorrhage into the arachnoid very often resembles hydrocephalus, either, as Rilliet and Barthez suppose, by a separation of the serum and crassamentum, or by exciting inflammation and effusion, according to Breschet and Legendre.†

Lastly, it would appear that chronic hydrocephalus may be a sequence of the acute meningitis already described.‡ In such a case the symptoms subside in a great degree, but do not disappear; the fever diminishes, the headache is less acute and only occasional, the pulse may become less frequent, but the symptoms of cerebral disturbance and oppression continue, although in a mitigated form. Dr. West observes that, even where no false membrane is found within the ventricles, their lining often presents other evidence, besides mere thickening, of its having been the seat of inflammation. Sometimes it is very hard and granular, presenting an appearance closely resembling shagreen, and communicating a very perceptible sense of roughness to the finger. "These and other similar alterations of the lining of the ventricles, afford conclusive evidence of the inflammatory origin of most cases of chronic internal hydrocephalus." M. Billiard thinks that chronic hydrocephalus succeeds almost constantly to acute meningitis, and I have seen one case at least which seems to confirm this view. At the same time I must not conceal that many authors, Barrier, Rilliet and Barthez, Breschet and Battersby, are opposed to this opinion.

Symptoms.—I have already quoted a description of symptoms in those cases in which the head is smaller than usual.

In other cases of *congenital* hydrocephalus, the symptoms at first may not be very striking, some want of muscular power or feebleness of one side, rather less intelligence than ordinary, and no attempts at articulate speech, will probably be all the phenomena to be observed.

The same may be said of most of the cases of *acquired* chronic hydrocephalus in the early period and at an early age. If the attack come on at a more advanced age, there will be a sort of retrogression of development; the child will lose its muscular power, or the natural exercise of it, the senses and intellect will be more or less deranged, &c.

* Mal. des Enfants, vol. ii., p. 32.

† Revue Méd., Dec., 1842.

‡ Copland's Dictionary, part i., p. 230.

But if the case be one of chronic meningitis, the train of symptoms are a good deal changed in character. Dr. Copland thus describes them: "Chronic meningitis commonly succeeds to the acute form of the disease, but it often presents the chronic characters from the commencement. There is generally continued headache, with slight somnolency, sluggishness and incapacity or want of desire for intellectual exertion, moroseness, irritability of temper, sometimes confusion of ideas, embarrassment of speech, and delirium, terminating in confirmed mania or idiocy. The motions of the limbs are slow, difficult, or painful, and their muscles are subject to involuntary motions and twitchings, and sometimes are not under the control of volition, or are altogether paralytic. Vomiting and convulsions are rarely present, excepting in *infants*, where they are often the chief or only signs. In children the peculiar knitting of the eyebrows, retraction of the angles of the mouth, whining or peevish cry, stupor, grinding of the teeth, scanty urine, obstinate costiveness, and increased heat of the head, are the chief symptoms."*

At a more advanced stage, the symptoms are common to all the varieties of chronic hydrocephalus which commence after birth with some modification. The organs of sense are all more or less affected, the eyes are turned upwards or downwards, or to one side, and unequally, so that the patient squints; the pupils are dilated, and the dilatation generally increases with the amount of compression; the sight is commonly weakened by degrees until it is finally lost, although in some it is preserved to the end. The nares become dry and insensible to odours; the hearing, which was delicate at first, is lost by degrees; the taste is generally preserved longer, and in some cases is perfect to the last; the touch is unaltered longer than any other sense, and may even be more acute than usual, although in many cases it becomes blunted.

Dr. Bright observes that sometimes at birth, and sometimes within a few weeks after, the sight is lost, though the hearing generally remains acute, and as the months pass on, instead of the intellect gradually developing itself, the mind is almost stationary and the powers of the body are paralyzed. Patients so affected generally lie in bed with the body and legs much bent and contracted, and lose the power of straightening themselves, and some have entirely lost the power of their legs, and retain a slight power of their arms.†

The state of the intellect varies in different patients. Perfect idiocy results from congenital hydrocephalus, as in the cases related by Schmitt‡ and Battersby; and this is confirmed by Espinol's experience.§ But in acquired chronic hydrocephalus, as a general rule, after effusion has taken place to any extent, we find the intelligence more or less affected,

* Dictionary of Pract. Med., part i., p. 230.

† Guy's Hospital Reports, vol. ii., part i., p. 424.

‡ Bibliothèque German., vol. vi., p. 264.

§ Mal. Mentales, vol. ii., p. 335.

excepting perhaps in some of those cases where the head rapidly enlarges. After a time, it is evident that the child has not the mind of his age; it has become stationary, and then it retrogrades until he acquires the look of an idiot, forgetful, scarce understanding what is said to him, babbling words without meaning, or at cross purposes, neither able to explain his sensations nor his wants, until at last he seems sunk in indifference, stupor, or coma.

This is not always the case, however. Michaelis mentions the case of a man, aged twenty-nine, whose head began to enlarge three weeks after birth. He entirely lost the use of his limbs, a slight movement of the arms alone excepted. He was never able to quit his cradle unless assisted by three or four people. As he never made use of his feet, they remained extremely small, and looked like those of a boy of twelve years, forming an odd contrast with the rest of his body, which was as large as that of a full grown person. His appetite and hearing were both good. His sight was imperfect, and he squinted. His mental faculties were not contemptible, though he was generally considered an idiot on account of his looking so stupid. His spirits were always good, and he was glad to see people.* Dr. Monro relates the case of a child whose head at eight years old measured two feet four inches in circumference, but whose memory was strong and retentive, and who was as lively as children usually are. He states, moreover, "that it is incredible how little the powers of the mind are impaired by this disorder, considering the great enlargement of the ventricles of the brain. I have had opportunities of seeing several examples of this form of hydrocephalus, and have watched the progress of the symptoms for years, yet I have never met with any one instance in which the power of the mind could be said to be completely deranged."† Dr. Spurzheim has described several cases in which the mental powers were not impaired; one in particular, a learned man, "whose head is extraordinarily high in the anterior-superior part of the forehead, and which, according to its size, must contain from three to four pounds of water; yet this man has extensive knowledge. The only inconvenience which results from his peculiar state is that he often falls suddenly asleep in the midst of the most interesting conversation, at table, at the theatre, and elsewhere."‡ I have had a little child of four or five years old under my care, who had been the subject of chronic hydrocephalus, apparently following an acute attack, whose head measured twenty-three inches in circumference, and whose intellectual faculties were apparently in a state of perfect integrity.

But, as a general rule, I quite agree with Dr. Watson that "most

* Lond. Med. Communications, vol. i. p. 404.

† On Hydrocephalus, p. 138.

‡ Monro, Morbid Anat. of the Brain, p. 138.

commonly the mental and voluntary functions are maimed and perverted, as may be seen in the cases related by Howship, Solly, Chatto, Reil, Craigie, Ecmark, and Ryan, referred to in Dr. Battersby's paper, as well as those added by himself.

The most striking feature of the disease is the enlargement of the head. In infants, it commences soon, and proceeds rapidly, owing to the separation of the sutures; but even when these are ossified, enlargement has taken place. The amplification is of the vault of the cranium only, the base remaining nearly unchanged; and it has been thus described by Dr. Battersby: "The vault of the cranium recedes from its centre, and the head augments in volume according as the quantity of fluid becomes considerable. The bones of the face neither participate in nor contribute anything to this enlargement. They conserve their natural volume and form. The bones of the cranium conspiring to its enlargement are the frontal, parietal, the superior part of the occipital, and a small part of the squamous portion of the temporal bones. These bones become expanded, thinned, and membranous. The frontal expands, is elevated, and advances forward over the eyes and the face, which looks narrower and shorter. The angle which the superior part of the frontal now enlarged forms with its orbital portion diminishes, and is effaced almost entirely, so that the eye is driven down and concealed by the lower lid, which ascends to the level of the centre of the pupil. Camper remarks that this disposition alone would suffice to recognize chronic hydrocephalus, even although all the rest of the head were covered. The bones forming the vault of the cranium are separated, and the intervals, more or less large, separating them are occupied by a fine membrane, through which fluctuation of the water inside can be felt distinctly. This separation is very great between the parietal bones, especially at the fontanelles. The membrane filling these spaces is sometimes distended to such a degree as to form a very visible longitudinal tumor. On pressing strongly the fingers upon these parts of the head, no depression is left, and the intervals of the bones yield to the compression like a bladder full of water. On gently striking one of these intervals, the liquid can be felt at the opposite side. Resistance is felt everywhere else, that is, in the parts naturally ossified."*

For a considerable time the face is unaltered, or if anything, it seems to shrink, and the aspect of the enormous head with the small face gives a very peculiar expression to the child—the *facies hydrocephalica*, as it has been termed: an old, withered, semi-idiotic look. Dr. Monro states that in the end the bones of the face are enlarged, and the angles of the eyes more distant from each other.

* On Chronic Hydrocephalus, Edin. Med. and Surg. Journal, Jan., 1850.

When the enlargement of the head is great, its weight is inconvenient, so that the child has much difficulty in supporting the head upright, and in extreme cases, when the muscles of the neck are weakened, it is quite unable to do so, and either reclines it on one shoulder or on some artificial support.

The power of locomotion is enfeebled in all cases, and in many absolutely lost. The limbs are weak and the walk uncertain and trembling, requiring assistance and support, until, from the atrophy of the muscles or want of innervation, the child is unable to walk at all, and remains in the recumbent position. In other cases the paralysis is observed earlier, even from the beginning, and, as Dr. Bright remarks, the patients lie abed with their legs bent under them, or, as in Dr. Ryan's case, where the child was nearly deprived of the functions of vision, hearing, taste, smell, and touch, and entirely of voluntary motion; and in those of Dr. Battersby's cases. In some cases one leg only is affected; in others, the lower half of the body, and occasionally the entire extremities. Not unfrequently the child is attacked by general or partial convulsions, and these may immediately be followed by paralysis, which may extend to the muscles of organic life, giving rise to difficult deglutition, retention of urine, constipation, or involuntary evacuations.

The respiration, circulation, and digestion are apparently unaffected for a considerable time. Many patients have a good appetite, nay, even a voracious one, and digest well, though without any increase of flesh. Vomiting, however, is observed occasionally. The pulse, which was natural or rather quicker than natural at first, becomes weak and small after a time, the heat and moisture of the skin diminish, the respiration at length becomes labored, without an access of dyspnoea. The appetite also diminishes; there is little relish for the food taken, and emaciation advances rapidly. In short, as M. Barrier has pithily observed, "the patient, deprived of the exercise of the functions of volition, is reduced to a vegetative life, which in its turn is gradually extinguished. I am not aware whether the cephalic bruit exists in chronic as well as in acute hydrocephalus. Drs. M. Barthe and Roger could not detect it. Rilliet and Barthez heard it in one case resembling chronic hydrocephalus, but on dissection the brain was found to be healthy. I tried in two of Dr. Battersby's cases and one of my own, but failed to discover it.

Pathology.—We have already seen how much the head is altered in size and shape, that the bones are widely separated, feeling as if loose underneath the skin, and that a species of secondary tumor is formed by the protrusion of the water.

The bones of the cranium are sometimes of their natural thickness, but more frequently they are thin, weak, semi-transparent, resembling parchment rather than bone. They are very porous, and the radiating fibres around each point of ossification are very visible. Dr. Battersby

observes "that the first lineaments of the Wormian bones are observed in hydrocephalic subjects of a very tender age. Breschet remarked little osseous needles in the membranes by which the edges are most generally united. These needles are very remarkable in the skull of a hydrocephalic fœtus preserved in the Museum of the Rotunda Lying-in Hospital." On the other hand, the bones are sometimes found thicker than natural. Ecmark, Malacarne, and Hartell have found them of a thickness proportioned to their surface or to the volume of the head. Riedlin says he met them twice as thick as natural in a hydrocephalic head of seventeen years. Joder speaks of a child two years old in whom all the bones of the vertex had a thickness of nine or ten lines. The cranium described by Molyneux was so thick that the physician took the head of the patient for that of a giant. Breschet met with a case of hydrocephalus in which the bones of the skull had the thickness natural to a well-formed adult, and were united by solid suture.

The size of the head varies widely. In some cases it is very great. Meckel states that he had seen a fœtus of seven months, the transverse diameter of whose head was sixteen inches. The head of another fœtus come to its full time was, at birth, fifteen inches in circumference and five inches in height. Another by Willan, at twenty months was twenty-eight inches in circumference and nineteen from ear to ear; one by Freind at two years was twenty-nine inches. A head in the Museum of the Rotunda Hospital, Dublin, is stated to have been twenty-two inches in circumference when the mother was delivered by the crotchet. Wrisberg delivered a Jewess with the crotchet, and the head was ten inches long and thirty and a half in circumference. Dr. Monro's case, at nine years, was thirty-six and a half inches in circumference. The head in Bartholin's case was forty-eight; in Cruikshank's, at sixteen months, fifty-two inches.

The quantity of fluid found in the hydrocephalic heads is often very considerable. Willan, in a child aged twenty months, found four quarts; Ecmark eight pounds, and Duncan eight pounds eight ounces; Wrisberg, in the Jewess's child, nine pounds; Brittner, twenty pounds; Stegman, twenty-four pounds; Cruikshank, twenty-seven pounds; Sequard, thirty-six pounds, and Sichel, fifty-pounds.*

Breschet's analysis of the serum is as follows:—

Water,	9.900
Albumen,	0.015
Osmazome,	0.005
Muriate of soda,	0.005
Phosphate of soda,	0.005
Carbonate of soda,	0.090

* Battersby's paper, Edin. Journal, Jan. 1850.

Other analyses by Marcet, Bostock, and Berzelius give nearly the same results. The fluid withdrawn by puncture by Dr. Battersby, at eight different times ranged from 1006·5 to 1014 spec. gravity. "Albumen was always present, but in very variable proportions; the quantity was sometimes very great, as at the second and third punctures, when it nearly equalled that in the fluid of ascites, forming when heated a solid mass like the coagulated white of egg. It sometimes amounted to a mere trace, and the specific gravity was influenced by the amount of it present, so that the former became a measure of the quantity present. Nearly the same salts were found in all the specimens, and generally in about the same proportions, viz: a large amount of the chlorides of potassium and sodium, small quantities of the sulphate of soda and the phosphate of lime, and a little free alkali, which always gave the fluid an alkaline reaction."

According to Breschet* the fluid may be contained (*a*) between the dura mater and the cranium; (*b*) between the dura mater and the arachnoid; (*c*) in the cavity of the arachnoid; (*d*) in the ventricles, or (*e*) in the laminæ of the pia mater. The cases of ventricular hydrocephalus are very much the more common, and in most cases there will be some fluid found in the spinal canal.

A recollection of these different localities will in a great measure enable us to understand the various conditions in which the brain has been seen by different observers. Thus the brain is said to have been found in a rudimentary state resembling a gland, and of small size, by Gall, Breschet, Baron, Billard and others, which would naturally result from compression exercised upon it by fluid on its outer surface; or it may, from extreme distension, assume the appearance of a thin, almost membranous bag, as in Dr. Battersby's cases and many others. According to the amount of distension will be the thinness of the walls of this pouch, and in extreme cases, it will be difficult to distinguish between the white and gray matter, or to recognise the central portions of the brain at all. Generally we find the corpus callosum raised nearly to the skull, the septum lucidum defective or injured, the corpora striata flattened, the nerves atrophied or softened,† or there may be no traces of these parts at all.‡ The substance of the brain may not only be unusually diminutive, but it may be softened and more or less disorganized.§

The membranes in cases of congenital hydrocephalus exhibit no morbid alterations; and even in acquired hydrocephalus, these changes are not very frequent. The dura mater is seldom altered, but M.

* Dict. des Sciences Méd., art. Hydrocephale.

† Bouchut, Mal. des Nouv. Nés, p. 453.

‡ Monro, Morbid Anat. of the Brain, p. 31.

§ Stewart, Dis. of Children, p. 525.

Breschet mentions the absence of the falx cerebri. The arachnoid is sometimes whiter than usual, and infiltrated with serum. The pia mater is excessively thin, but not destroyed. On the other hand, some cases occur in which there is evidence of inflammation, as in the case described by Dr. West, which I have already quoted, where the membranes were thickened and rough with granulations, or covered with a layer of false membrane both at the base of the brain and in the ventricles.

A question of some interest in pathology still remains, viz.: What is the proximate or pathological cause of congenital hydrocephalus?

After a very careful research and a minute examination of the condition of the brain in these cases, Dr. Battersby has come to the conclusion that chronic hydrocephalus is always congenital, and that congenital hydrocephalus is due to an arrest of development, thus confirming the opinion of Meckel.* M. Breschet observes: "there is a circumstance to which I shall direct the attention of physicians, and which appears to explain the frequency of serous intercranial effusions in general, and especially of congenital hydrocephalus. The fine researches of M. Majendie on the cerebro-spinal fluid leave no doubt of the existence of this liquid at all periods of life, intra-uterine, and extra-uterine, and its abundance as well as its constancy appears to demonstrate that this liquid performs important functions. Here, then, is a natural hydrocephalus, or one which is united with the regular performance of the functions of the brain and spinal cord. The study of organic evolutions has caused this fluid to be recognized as more abundant at the first period of the formation of the cerebro-spinal nervous centres than at any other epoch of life. From the existence of this fluid, from its more considerable quantity during the first phases of life, to the existence of hydrocephalus, there is but a degree."† Now if we compare the condition of the different parts of the brain, as the corpus callosum, fornix, septum lucidum, &c., in the case of congenital hydrocephalus, with the description by Tiedemann, of the brain of the fœtus at different periods, we shall see sufficient exactness to lead to the belief that an arrest of development did take place at a certain period, whether in consequence of the increase of the head, or from some other cause. If, moreover, Dr. Todd's opinion be generally accurate, that "when an arrest of development of any portion of the cerebro-spinal axis has taken place, the space which ought to be occupied by the organ of imperfect growth is filled with liquid,"‡ we have the case pretty well proved, and may conclude with

* Anat. Pathologique, vol. i. p. 262.

† Dict. de Méd., art. Hydroceph. Chronique, p. 511.

‡ Cyclop. of Anat. and Phys., part xxv. p. 642.

Meckel, Breschet, Duncan, and Battersby, that "whatever be its remote cause, congenital chronic hydrocephalus depends on an arrest of development of the brain, or, according to Mr. Anderson and Dr. Coste, of the proper brainy material."

Differing, as I must, in some degree from Dr. Battersby, in not regarding every case as congenital, I should not, of course, apply any such explanation to those cases caused by tumors or local pressure of any kind, or to those still fewer, the result of inflammation.

The *duration* of the disease varies so much in different cases that no general rule can be laid down. Some cases live for a year or two, and then die; others live for twenty or thirty years a sort of vegetable life. Those who are attacked by the disease after the sutures are ossified, are carried off much more rapidly than others, because of the greater pressure upon the brain; but if the amount be not greater than the brain can bear, and if its increase be arrested, then life may be prolonged. Mr. Sedgewick has related a curious case in which a child laboring under this disease was twice saved from impending death by the spontaneous escape of a large quantity of fluid from the nostrils, and ultimately recovered.*

Sooner or later, however, almost all the cases terminate fatally, either from the pressure, from an attack of acute disease, or from the absence of due nervous influence upon the organs necessary to life, and the consequent failure of those functions.

Causes.—I have already mentioned the proximate causes of this disease and as to exciting causes, such as blows, falls, cold, worms, &c., our information upon the subject is so vague that it would be unwise to found any definite opinion upon it.

Diagnosis.—The only difficulty in diagnosis which can arise is previous to the enlargement of the head, and our judgment must be formed by a careful analysis of the functional disturbances already noticed, among which M. Breschet regards as most important the vacillation of the voluntary muscles, the difficulty of equilibrium, and the inclination of the head.

I. If there be any fever, the case might at first present some resemblance to infantile remittent, but the absence of remissions and the gradual increase of cerebral symptoms will clear up the doubt.

II. The very rare cases of chronic hydrocephalus where no cranial enlargement takes place will be with great difficulty distinguished from tumors or tubercles of the brain, inasmuch as the muscular weakness, want of equilibrium, headache, and in some cases vomiting, are common to both. Probably the age and constitution of the child, and the duration of the disease, may throw some light upon the matter, as, for in-

* Med. Times and Gazette, March 15, 1856.

stance, in a child exhibiting scrofulous tubercles, in other situations we might suspect that the head symptoms proceeded from a similar cause.

III. After enlargement has taken place, if the sutures be ossified, it might in some cases be hard to distinguish between chronic hydrocephalus and hypertrophy of the brain, there being many symptoms in common between them: if the sutures be not ossified, the presence of fluid can scarcely be mistaken, and in the former case, I should think that the history of the disease would be a tolerably safe guide.

Treatment.—The principal internal remedies from which we have any hope, and but very little from them, are mercury, sudorifics, diuretics, and purgatives, with the occasional abstraction of a small quantity of blood, if there be any evidence of congestion or inflammation such as quicker pulse, heat of scalp, or turgescence.

Dr. Watson speaks in favorable terms of Dr. Graves' plan in two instances. Ten grains of crude mercury, one scruple of manna, and five grains of fresh squills are to be rubbed together for one dose, to be repeated every eight hours. The first patient, a lad who had been ill for two or three years, took the above dose three times a day for nearly three weeks, ptyalism being produced. Its effects were great prostration of strength and loss of flesh, with gradual relief of all his sufferings. It operated profusely by the kidneys. The medicine was continued twice a day, and at length once a day, for another fortnight, when all the symptoms of the disease had disappeared. The boy was greatly emaciated. He was then ordered an ounce and a half of Griffith's mixture thrice daily, and soon regained his health and strength, and got quite well. The second case, a youth of twelve years old, after resisting all other remedies, was treated in the same way, and the result was a permanent cure. The strength of the dose must of course be modified according to the age and strength of the child. I may say indeed that mercury in some form or other, from its control over the inflammation of serous surfaces, and from its power of stimulating the absorbents, and in combination with squills or digitalis, or both, from its diuretic effects, is our sheet anchor in most cases. Drs. Reid, Clanny, and others, recommend it to be given in large doses, and state that they have found it very useful. I confess from my own experience I should prefer moderate or small doses, as producing less disturbance. At the same time, we may increase the rapidity of the mercurial action by using inunction with strong mercurial ointment, or by dressing the blister with it. Mr. Wilson speaks strongly in favor of mercurial inunction as a means of reducing the size of the head.*

Gölis recommends calomel internally, mercurial frictions to the head, and slightly irritating baths, generous but not stimulating diet, and

* *Monro, Morbid Anat. of the Brain, p. 146.*

fresh air when the weather is suitable; by which means he seems to have been very successful.

M. Barrier mentions that iodine has succeeded in a few cases,* and from its benefit in scrofulous cases it seems deserving of a trial. Drs. Maunsell and Evanson speak favorable of it.

More recently Dr. Guerond† and Mr. Hoskyns have published each a case in which iodide of potassium was given with great success. Half a grain may be given every four hours to a child two years old.

Counter-irritation by blisters or issues is doubtless of great use, and when bleeding is inadmissible it is the best means of reducing the chronic inflammation. Almost all writers are agreed upon the employment of blisters to the head (after having shaved the scalp), or along the spine.

Dr. Mills recommends the tartar emetic ointment to the scalp, and that by some means a permanent drain should be established on the vertex or in its neighbourhood.‡

Two external modes of treatment have been proposed, and to a certain degree have been successful.

1. From an opinion that effusion might be the result of want of firm resistance by the unossified cranium, compression has been tried. Riverius mentions the case of a boy who was thus cured.§ Sir Gilbert Blane used bandages around the head;|| Mr. Bernard straps of adhesive plaster;¶ and M. Engelmann, of Kreusnach, both bandages and plaster. Sir G. Blane's case was cured in less than three months. In Mr. Bernard's cases considerable benefit was derived, and in Engelmann's cases, ten in number, the fluid was absorbed, and the patients recovered.** Other successful cases are on record.†† M. Jadioux, however, regards it as insufficient and injurious. Mr. Hood, of Ayton, tried it, but without success; the pressure brought on convulsions.

Of course, to produce any good effect, the compression must be gradually increased, and continued for a considerable time. M. Trouseau uses strips of diachylon plaster, about one-third of an inch broad, and applies them, "1, from each mastoid process to the outer part of the orbit of the opposite side; 2, from the hair at the back of the neck, along the longitudinal suture, to the root of the nose; 3, across the whole head in such a manner that the different strips shall cross each

* *Mal. de l'Enfance*, vol. ii. p. 614.

† *American Jour. of Med. Science*, 1851. *Ranking*, vol. xii. p. 330.

‡ *Trans. of Association*, vol. v. p. 457.

§ *Obs. Commun.*, 6.

|| *Lectures on the Structure and Physiology of the Bones*, p. 269.

¶ *Lancet*, No. 137, p. 52.

** *Archives Gén. de Méd.*, June, 1838.

†† *Lancet*, No. 841, p. 82.

other at the vertex; 4, a strip is cut long enough to go thrice round the head, so as to make a firm and equable pressure.* If symptoms of compression appear they must be loosened, or if the skin be irritated they must be removed. Drs. Watson and West recommend the trial of Dr. Arnott's air press, as probably superior for the purposes of compression to any other means.

2. Puncture of the cranium and evacuation of the fluid was proposed by some of the older surgeons (Severinus and Le Cat, &c.), and in recent times has been practised by Vose, Rossi, Conquest, and many others.

In the former edition I mentioned that a considerable amount of success had attended the operation, but the careful investigation of Dr. Battersby has shown that there is reason for believing this to have been over-estimated. Of 56 cases included by Dr. West in his list, 16 were said to have recovered, but the list of cases, on strict inquiry, appears by no means so favorable to the operation. Some were merely relieved, others remained the same; others had not been seen for some time, &c., so that, according to Battersby, "the conclusion we are justified in holding from an examination of the 16 cases reported by West, is, that not more than four of these (Graefe's case and three of Conquest's, which I still look upon as doubtful) were cured." Three other cases are reported as cured by Drs. Whitney,† Edward,‡ and Kitsell.§ Dr. Irwin has tried the injection of tincture of iodine after evacuating the fluid. The child died on the 10th day, but there had been very little reproduction of fluid.||

On the other hand, besides the 40 unsuccessful cases in Dr. West's list, there are many other failures on record. "Monro states that at Liverpool, after Vose's case, several cases were operated on which died.¶ Breschet operated several times without success,** as did also Dupuytren three times. Dr. West gives a fatal case from Fabricius Hildanus.†† A like want of success attended the cases given by Tulpus,‡‡ Schenkus,§§ Ferdinandus,||| Panarolius,|||| Muraltus,|||| Wepfer,¶¶

* West's Lectures, Medical Gazette, August 16, 1847, p. 270.

† Amer. Journ. of Med. Science, Oct. 1843, p. 303.

‡ Edin. Monthly Journal, p. 398, 1846.

§ Amer. Journal, Jan. 1850, p. 218.

|| Lancet, Nov. 3, 1855.

¶ On Hydrocephalus, p. 147.

** Dict. des. Sciences Méd., vol. xv. p. 455-6.

†† Obs. Chir. Cent. 3. obs. 17.

‡‡ Obs. Med., lib. i. p. 47.

§§ Obs. Varios., p. 10.

|||| Monro on the Brain, &c., p. 70.

¶¶ Obs. Med. Pract., pp. 49, 53, 60.

Forestus,* Francus,† Schenkser,‡ Zang,§ Junker,|| Sorbait,|| Petit,|| Loftie,¶ Froriep,** Lee,†* Vose,‡* Jeffrey,§* Dickinson,||* as also the more recent cases of Woodroffe,¶* Watson,*† Dendy,†† Parkman,‡† Whitney,§† Bellingham,||† Taylor,¶† Campbell,*† Storks,*† Martin,†† Gotz,‡† Charter,§† Fergusson,||† Physic,¶† Taylor,*§ Pepper,†§ and Battersby. We have already seen that Holbrook, Kilgour, and Fergusson punctured the head without effect, as also did Mr. Dendy, five times, whilst Monro and Wutzer opened the dura mater alone. Spengler and Barruel also appear to have punctured the brain, but with what effect I have been unable to learn. An accurate examination of ancient and modern medical works would very probably discover other cases, but the above authorities, along with the forty cases in Dr. West's table, give about 100 unsuccessful, against seven alleged successful cases, or in other words, one patient in 14 was cured by puncturing the head. But this proportion I do not regard as by any means exact, as I have known of the operation having been performed in Dublin about ten times unsuccessfully, and I have heard of others

* Schol. and Observ., 30, lib. vii. Schenck., p. 10.

† Schenk., Obs. Med., lib. i.

‡ Vallisneri, Opera, vol. i. sect. 5.

§ Darstel. blutig. Operat., bd. ii. 3. Aufl. p. 68.

|| Copland's Dict., vol. i. p. 682.

¶ Med. Obs. and Inq., vol. v. p. 121.

** Notizen aus dem Geb. der Natur und Heilk., vol. v. No. 102, p. 224.

†* N. Y. Med. and Phys. Journ., 1828.

‡* Med. Chir. Trans., vol. xiv. p. 354.

§* Lancet, vol. i. p. 617. 1836-7.

||* Ibid., vol. ii. p. 42, 1838-9.

¶* Dub. Med. Journ., vol. xxiii. p. 37.

*† Library of Med., vol. v. p. 147.

†† Winslow's Psycholog. Journal, Monograph, p. 11.

‡† Amer. Journal, vol. xvi. p. 299.

§† Amer. Journal, Oct. 1843, p. 305.

||† Dub. Med. Press, vol. iv. p. 148.

¶† Med. Gazette, Jan. 26, 1850.

*† Fergusson's Surgery, p. 491.

†† Mem. de Med, 1835.

‡† Ester Med. Jahrbuch, June, 1846.

§† Prov. Med. and Surg. Journal, Oct. 1845.

||† System of Pract. Surgery, p. 491.

¶† Med. and Phys. Journ., vol. lvii. p. 44.

*§ Lond. Med. Gaz., Jan. 1850.

†§ Amer. Journ. of Med. Science, Oct. 1850, p. 552.

in the country, in which it was undertaken ineffectually. Unfavorable results are seldom recorded.”*

Now, if we could ascertain that the fluid was external to the brain, there might be some hope that in such cases, relief and even cure might be effected by letting out the water, but as I do not believe that this is possible, and as such cases are extremely rare, I believe we can scarcely make an exception in their favor. And with regard to the operation in ventricular chronic hydrocephalus, the above statements are sufficient to condemn it altogether.

Nay more, even if by it we could evacuate the water, and that no more was secreted, the condition of the brain is such, as I witnessed myself in Dr. Battersby's case, that there could be no hope of its recovering a natural healthy working condition. The operation is, as Mr. Fergusson remarks, “attended with considerable danger, not from the puncture, which is a very simple matter, nor from the sudden escape of a fluid, nor from the wounding either a vessel or the brain, but from the inflammation likely to succeed.” It is usually performed with a very fine trocar, on one side of the sagittal suture, so as to avoid the situs, and pressure should be made as the fluid escapes.

HYDRENCEPHALOID.—As a contrast to hydrocephalus, my American Editor has inserted the following sketch of an attack with which it has sometimes been confounded and which as it may be a useful guide to the junior practitioner, I have thought well to preserve:—There is an affection of the brain incident to the period of infancy resembling in many of its symptoms the latter stages of chronic hydrocephalus, so as very often to be mistaken for it. A more grievous error could not be committed, inasmuch as the disease to which I allude always originates from another cause, and undoubtedly demands a very different treatment. I refer to the affection which has been so ably described by Drs. Marshall Hall and Robert Gooch, and which has been designated by the former by the term *hydrencephaloid*, on account of its symptoms very often presenting a striking similarity to those which betoken inflammation of the brain.

My experience has led me to believe that this disease is of frequent occurrence, and of so insidious and masked a character as to mislead the inexperienced members of the profession, and cause them to resort to a treatment calculated to aggravate the disorder; hence, I have deemed it proper to insert a few remarks upon this subject.

“This affection,” says Dr. Marshall Hall, in his admirable essay on the subject, “may be divided into two stages; the first, that of irritability; the second, that of torpor. In the former, there seems to be a feeble attempt at reaction; in the latter, the vital powers appears to be more prostrate. These two stages resemble in many of their symptoms

* Essay, Edin. Med. and Surg. Journ., July, 1850.

the first and second stages of hydrocephalus respectively. In the first stage, the infant becomes irritable, restless, and peevish, the face flushed, the surface hot, and the pulse frequent; there is an undue sensitiveness of the nerves of feeling, and the little patient starts on being touched, or from any sudden noise; there are sighing, moaning, and screaming during sleep; the bowels are generally flatulent and loose, and the evacuations disordered. If, through an erroneous notion as to the nature of the affection, nourishment and cordials be withheld, or if diarrhœa supervene, either spontaneously or from the administration of medicine, the exhaustion which ensues is apt to lead to a very different train of symptoms. The countenance becomes pale, and the cheeks cool or cold; the eyelids are half closed; the eyes are unfixed, and unattracted by any object placed before them; the pupils unmoved on the approach of light; the breathing, from being quick, becomes irregular and effected by sighs; the voice becomes husky, and there is sometimes a teasing cough; eventually, if the strength of the little patient continue to decline, there is a crepitus in the breathing, the evacuations are unusually green, and the feet cold."

These symptoms will sometimes supervene in young infants to early weaning, especially if they should be subjected to improper food. Drs. Marshall Hall and West seem to attribute this condition of spurious hydrocephalus to either an enfeebled condition resulting from weaning or to an exhausting treatment applied for some previous complaint. I have seen many cases, however, in which the children affected had had no previous illness, and the exhausting treatment had been applied subsequent to the drowsiness and other characteristic symptoms; and these are the cases in which the practitioner is most liable to be deceived. The children thus affected have been laboring under acute chlorosis; and I have no doubt that the drowsiness, &c., is accompanied in most cases by the distressing headache, throbbing in the head, and noises in the ears, which generally accompany this enfeebled condition of the system, one which in every way resembles the "pale-faced" amenorrhœa of puberty in after life.

I do admit the fact that this disease is very often incident to some grave illness, which is very exhausting in itself, or for the treatment of which active measures have been necessary; hence, it is very frequently found accompanying the earlier stages of pneumonia, where the sympathetic disturbance of the brain has caused a powerful treatment to be directed to that organ, which has been erroneously considered as primarily affected.

We may have this disease originating also in cases where there has been congestion of the brain, and where, through over anxiety on the part of the practitioner, too powerful or too continued a depletory plan of treatment has been adopted. Under such circumstances, the primary cerebral symptoms may be alleviated by the remedies; but in a short time the child apparently relapses into the same condition; there is restlessness, jactitation, moaning, flushed cheek, drowsiness, irritable

stomach, and tympanitic condition of the abdomen. To the unwary, these may all seem positive indications for resorting again to the treatment which was so successful in arresting the same symptoms in the commencement. Should these erroneous views be carried out, the little patient will sink into a deep coma, and die, not indeed of hydrocephalus, but rather of pure exhaustion, or from serous effusion, the too fluid blood leaking out of the weakened vessels.

Under all circumstances, therefore, of cerebral irritation, it is essential for the medical attendant to inquire into the previous history of the patient. Discover whether the food of the child has been of such a quantity and quality as to sustain the increasing wants of the growing child. Examine whether it has been subjected to any exhausting discharges calculated to exhaust its nervous system and interfere with its nutrition.

I have met with several cases of pneumonia in which the sympathetic disorder of the nervous system had induced so much cerebral disturbance as to mask the original disorder, all the remedies had been previously directed to the brain, and as soon as the true seat of the disease was discovered the local depletion adopted for its treatment, superadded to that which under a misapprehension had been directed to the brain, were too much for the little sufferers to endure, and consequent symptoms of cerebral disorder set in which were still supposed to be those of advancing disease. Too much caution cannot be exercised on this point, and my own experience leads me to apprehend that many a little sufferer is hurried to an untimely grave by the fear of acute hydrocephalus on the part of the physician, whilst in reality the opposite condition of things exists.

As the diagnosis of this affection is obscure, and mistakes easily committed which have the most mischievous results, where a doubt crosses the mind as to the nature of the case, an expectant plan of treatment would be more safe and judicious than any other, the mere abstinence from remedies, or a species of masterly inactivity in the case and allowing nature to act, often affording us a valuable hint as to the indications to be pursued.

When, however, our diagnosis is positively made out, there is no disease which admits of more effectual prevention and treatment.

As soon as the existence of any of the symptoms described is ascertained, the child should be put on good diet and all exhausting treatment immediately suspended, and tonics and stimulants should be given freely.

The state of restlessness and irritability, so characteristic of this affection, must be alleviated by means of anodynes. I have found it a judicious plan, as a general rule, to be guided by the state of the pupil; in all cases where it is dilated, I administer sufficient doses of opium, or some of its preparations, to overcome this condition of the pupil; the fluid extract of valerian and assafœtida, administered either by mouth or rectum, have also an excellent effect in calming the nervous irritability.

In administering opiates, a sufficient quantity, proportioned to the age of the patient, should be given to calm the excitability and produce sleep ; in smaller doses it is apt to excite, and by the want of sleep which it produces, it may maintain the very condition which we wish to combat.

In the stage of coma, we must rouse the system by means of sinapisms applied to the whole cutaneous surface, and by free administration of brandy and milk, also enemata of brandy and water. In some cases of very great excitement, I have had great success with inhalations of small quantities of ether ; in one case particularly, where a little girl four years old, affected with this disease consequent upon a protracted pneumonia, screamed day and night incessantly, after having tried in vain anodynes, &c. I had recourse to the inhalation of thirty drops of washed ether dropped on a pocket handkerchief. The result was truly marvellous ; she fell into a deep refreshing sleep for three hours, and her convalescence progressed rapidly from that moment.

Where tonics are required, I believe that there is no better combination than a mixture consisting of the ammonio-citrate of iron and the sulphate of quinine.

There is one point which must never be lost sight of, viz. : that no kind of depletion must be used either directly by loss of blood or indirectly by exhausting purges.

In cases where doubt exists as regards the affection, I have found that the employment of anodyne enemata, consisting either of laudanum or of the fluid extract of valerian soon produced such effects as to convince us positively of the form of the disease existing, and to justify us in pursuing a supporting and calming plan of treatment.

CHAPTER VIII.

INFLAMMATION OF THE BRAIN.—ENCEPHALITIS.—INDURATION AND HYPERTROPHY.—SOFTENING.—ABSCESS.

INFLAMMATION of the substance of the brain, as distinguished from meningitis, with which it is often partially complicated, is a very rare disease of infancy and childhood, and indeed its existence is chiefly proved by some of its terminations. And it is consequently difficult to separate the symptoms which characterize the period of inflammation from those, for example, which mark the occurrence of softening or of abscess. On this account the present description should be read in connection with the notice I shall presently give of ramollissement, &c.

It does not appear peculiar to any exact age, but certainly is less

frequent during infancy than childhood ; nevertheless I saw one case of a very young infant, the substance of whose brain exhibited traces of inflammation, and was extensively softened.

Symptoms.—The characteristics of encephalitis are much less vividly marked than those of meningitis ; it is sometimes preceded by disordered health for some time, loss of appetite, deranged bowels, occasional headache ; or it may attack a child suddenly awaking out of sleep, trembling and frightened : or in the daytime by headache, vomiting, confusion, and more or less of stupor ; or it may commence by a violent convulsion ; or lastly, some defect of movement, or difficulty of speech, increasing to absolute loss of the power of articulation, as in Mr. Durand's case, may be the earliest intimation of serous disease of the brain. The sensibility in some few cases is increased at the commencement, but soon diminished ; the eyes are heavy and the pupils dilated. The intellect is generally confused, and in some cases the patient is for a time delirious. More commonly, however, there is a degree of stupor ending often in insensibility. How far inflammation of one hemisphere, or of a portion of one hemisphere, may interfere with the phrenological functions of the organs there situated, and so with the mental manifestations, I am not prepared to say.

The convulsion may be repeated, or paralysis of one side (hemiplegia) may supervene, even during the early stage ; or the paralysis may be partial, and combined with involuntary movements, twitchings, or convulsions of other limbs. In some cases the limbs become powerless, and without muscular tone, so that, when raised and allowed to fall, they do so like the limbs of a dead person.

However slight the effect upon the muscular system may be, the powers of locomotion are affected ; irregularity and difficulty of walking, want of equilibrium, the impossibility of standing, or sometimes of sitting, are symptoms commonly observed. Dr. Copland has remarked : " When cerebritis is general, these symptoms affect all the limbs simultaneously ; when local, only some of them, according to the seat of the inflammation."* Occasionally, but much more rarely, the limbs, or some of them, become rigid, and much pain is experienced in attempting to straighten them.

The expression of the countenance is different from that in meningitis, seldom so acute or excited, generally pallid and anxious, or calm and pale, unless the muscles of the face be spasmodically affected. There is rarely much fever, the pulse is pretty quick and small, and in some cases is but little changed. Respiration is at first rapid and regular, but afterwards irregular and interrupted. The stomach is very frequently disordered, and vomiting, at least occasionally, is present. The bowels may be free or constipated.

Many of these symptoms, even the most characteristic, may be ab-

* Dict. of Med., part i. p. 231.

sent, but all may be present when there is nothing but simple inflammation of the brain, nay, the disease running on into stupor and coma may end fatally, leaving no other traces in the brain than those of inflammation; but in the majority of cases the disease is not thus arrested: it continues longer, new symptoms are developed, indicating further disorganization, and the disease terminates either in, 1, induration and hypertrophy; 2, softening; or, 3, abscess.

A *post-mortem* examination reveals considerable congestion of all the vessels of the brain, especially of the pia mater, and a minute vascular condition of the brain generally, or of some part of it. In almost all cases, moreover, we find evidences of a more advanced state of disease, to which I shall refer by and bye.

Causes.—All the causes which act upon the nervous system, as enumerated among the causes of meningitis, appear capable of producing encephalitis. There are some local affections which have been followed by the latter disease, and which I must not omit to notice. In a case quoted in Rilliet and Barthez, the child, aged nine years and a half, had shortly before suffered from purulent ophthalmia, by which she lost an eye, and it seems probable that this may have had some share in the subsequent cerebral attack.

Other cases are on record, in which inflammation of the brain has followed disease of the ear. Dr. Abercrombie mentions a case of inflammation and abscess, which came on in a boy who had been two months affected with headache and discharge from the ear; and others have recorded similar cases.

Diagnosis.—I do not know of any symptoms sufficiently pathognomonic to enable us to pronounce with certainty that the substance of the brain alone is affected by simple inflammation. The more rapid loss of voluntary power, the earlier occurrence of paralysis and stupor, and the inferior amount of excitement, mark certainly a difference between the present disease and meningitis; but although the history of the two diseases varies a good deal, the differences are not very characteristic.

Treatment.—However difficult it may be to distinguish between this and other cerebral diseases, there can be no doubt in any case that the brain is affected, and by an inflammatory disease, so that our plan of treatment is pretty clear.

Abstraction of blood by leeches or venesection is essential at an early period of the disease, and the quantity must be regulated by the constitution and strength of the patient, and the intensity of the disease. *Cæteris paribus*, however, I do not think that excessive blood-letting is so necessary in this disease as in meningitis; but if the symptoms continue unmitigated, the leeching should be repeated.

Counter-irritation, by iodine frictions or by blisters to the head, neck, or behind the ears, will also be necessary, and it will be well to dress the blister with mercurial ointment, for our great object should also be to bring the system under the influence of mercury. Calomel

or the hyd. c. cretâ, may be given in moderate doses frequently, combined with the pulv. cretæ c. opio, if the bowels are too freely affected, and continued until either the gums are tender or mercurial stools produced. If the bowels are constipated, purgatives will be necessary.

The diet should be mild and unstimulating during the period of inflammation; it may be increased when other symptoms set in, if the child can swallow.

We shall now proceed to treat of the terminations of encephalitis, and first of

I. HYPERTROPHY AND INDURATION OF THE BRAIN.

I must candidly inform my readers that there appears considerable doubt in the minds of pathologists as to whether hypertrophy and induration are the result of inflammation: the disease is rare, and generally obscure, and it is not easy to trace its origin, but, judging from analogy of other organs, I am inclined to regard it as the result of inflammatory action. Hufeland remarks, that any cause which gives rise to congestion of the brain may also cause hypertrophy; and Laennec, who was one of the first to describe the disease, remarks: "It has happened to me to see several cases, which I considered internal hydrocephalus, but which, on a *post-mortem* examination, presented but a small quantity of water in the ventricles, although the flattened convolutions of the brain proved that this viscus had undergone a degree of compression which could only be attributed to excessive size and consequently to too active nutrition of the cerebral substance."*

The disease has not been long known, and we are indebted for our information chiefly to the researches of Scouttetten, Jadelot, Laennec, Bouillaud, Andral, Münchmayer, Papavoine, Sims, Green, Lees, Mauthner, &c. Mauthner has taken the trouble to weigh the brains of 216 children, of all ages, *from birth up to the eighth year*, so as to show the gradual and healthy increase of the organ. "During this time," says he, "we find a minimum of ten ounces, six drachms, rise to a maximum of forty-four ounces and a half. The average weight begins with thirteen ounces and a half, and rises to thirty-five ounces and a half. During the first year it grows from thirteen ounces and a half to twenty ounces and a half, or seven ounces; in the second, from twenty ounces and a half to twenty-five ounces and a half, or five ounces; in the third, from twenty-five ounces and a half to thirty-two ounces, or three ounces and a half. Hence it appears that the brain grows most rapidly in the first year of life, that in the second and third years its increase is still considerable, but that its growth is slower after the fourth year. In con-

* Rilliet and Barthez, *Mal. des Enfants*, vol. i., p. 654.

clusion, it may be observed, as a remarkable fact, that the minimum weight usually occurs in cases of atrophy or phthisis, and the maximum in pneumonia, scarlet fever, apoplexy, and cerebral tubercle.* It also appears that the weight is to a great degree dependent upon the amount of blood contained in the brain.

Symptoms.—The early period of the disease is marked by dulness, drowsiness, or apathy, with an apparently excessive size of the head. There is generally irritability of temper, giddiness, and habitual headache, with severe exacerbations.

In passive hypertrophy, M. Mauthner remarks that the shape of the cranium is much changed, and the occiput occasionally prominent and globular; the parietal protuberances subsequently project; the coronal and sagittal sutures continue unossified up to the ninth or twelfth month, and the fontanelles much longer; the growth of hair is scanty, and the veins of the scalp swollen. The child sleeps much, though easily startled; the head perspires a good deal, and droops forward by its weight. Attacks of crowing inspiration occur when the child cries, and not unfrequently end in convulsions, especially during the period of dentition. The digestion is impaired, and vomiting and diarrhoea are frequent. Gradually we find symptoms of compression developed, or they may suddenly appear as the result of the child being attacked by some other disease. "When hypertrophy of the brain has reached this stage, the skull deviates still more from its natural shape, the forehead sometimes becomes prominent and globose like the occiput, and while the skull goes on acquiring an increased curvature, the region of the temples continues flat, and thus contributes to give to the head the appearance of being formed by the union of the segments of four spheres. During this stage of the affection, the preternatural softening and thinning of the cranial bones corresponding to the prominences of the convolutions, are distinctly perceptible, especially at the occiput. The functions of the brain become now much disturbed; headache, giddiness, impairment of muscular power, and loss of memory, occur; the child grows sullen, peevish, sleepless, whimpers continually, and rolls the head constantly from side to side. At the same time it seems choked with phlegm, while the skin becomes every day more flabby, the muscles shrink, the bones grow soft, and the muscular power rapidly diminishes. Hence these children usually lie on the back, breathing with habitual wheezing, and suffering from constant dyspnoea, with occasional asthmatic seizures, such as have been already described. When in this condition slight causes suffice to produce a general excitement of the vascular system, and to excite diseased action in other parts, which render still more obvious the influence of hypertrophy on the nervous system generally. If the child happen to catch a slight

* British and Foreign Review, No. 42, p. 387.

cold, attacks of convulsions, cough, or of asthma, occur in consequence, or convulsions come on, which terminate life in a few days.”*

When the disease is active, according to Mauthner, *i. e.*, when the walls of the skull do not yield in proportion to the increase of the brain, the symptoms are those of more acute cerebral disease, the result of compression. There is also some modification of the symptoms, where the hypertrophy and induration are partial, according to the peculiar locality. Further, symptoms resembling those of hypertrophy, but very severe, have been noticed, where the skull is ossified and unusually thick, and does not yield to the increasing size of the brain.

The intellectual faculties are generally enfeebled, but Dr. Elliotson relates a case in which they were rather increased in activity and power, and Dr. Condie mentions a child of five or six years old, whose head was as large as an adult's, and whose intellects were clear and acute.† This may be expected, if at all, in cases of such enlargement; as the intellectual disturbance and many of the symptoms are the result of compression rather than hypertrophy. I have myself had two cases under my observation in which the head rapidly increased out of all proportion during early infancy, so that at two years old each head was as large as that of a child of seven or eight years. No morbid symptom was developed, the children were active and extremely intelligent, and the health good. At this time they are seven and eight years old, and the size of the head in proportion to the body is not remarkable. What was the nature of the enlargement?

The size of the head will vary a good deal, the younger the child the more distensible the cranium. Dr. Münchmayer‡ has noticed a peculiar prominence of the parietal protuberances, and this observation has been confirmed by Dr. Lees, who regards the symptom as a valuable distinction between hypertrophy and chronic hydrocephalus.§ The other symptoms especially noted by Dr. Lees in his cases were obtuseness of intellect, apathy, great irritability and excessive appetite. Drs. Sims and Green have noticed a sensation of firmness communicated to the finger when the pressure is made upon the fontanelles, and regard this as a valuable diagnostic sign. Andral observed mania to occur in one case; others have noticed delirium, and some idiocy, with a repetition of fits like epilepsy.

The duration of life in children thus affected is subject to great variation. Some arrive at puberty with but little inconvenience; but many die during childhood from the consequences of the hypertrophy, such as convulsions, &c., or from states of the brain superinduced by other diseases.

* Mauthner, p. 174. British and Foreign Review, No 42, p. 388.

† Diseases of Children, p. 383.

‡ Schmidt's Jahrbucher, vol. xxv., 1840.

§ Dublin Journal, vol. xxii., p. 24.

Pathology.—The change in the brain which strikes the eye at once is its increased size in most cases, and the evident flattening of the convolutions, diminished vascularity, and the absence of serum in the ventricles or at the base of the brain. When the head is much enlarged, the alteration in the consistence of the brain may not be very remarkable, although in general it will be found more dense than usual. But when the cranium has been ossified, or has not yielded to the pressure of the brain, the cerebral tissue will be found firm and elastic to the touch, and, cutting clear by the knife in thin slices, the gray matter paler than usual, and the white matter more brilliant. Or it may be still more firm, and offer some resistance to the knife or to pressure. Its weight is greatly increased, sometimes even doubled. Professor Rokitsky states, as the result of many microscopic examinations, that its augmented bulk is not produced either by the development of new nervous fibrils, or by the enlargement of those already existing, but by an increase in the intermediate granular matter. According to Sims and Rilliet and Barthez, the hypertrophy and induration may be limited to the corpora striata or optic thalami, or to one lobe of the brain, which, of course, will condense the parts in its neighbourhood more or less.

The membranes of the brain are sometimes pale, sometimes injected, and distended so tightly by the brain that when an incision is made the brain protrudes.

M. Mauthner has remarked a frequent coincidence of enlargement of the thymus gland, the left side of the heart, and the liver, thus affording some support to Münchmayer's theory of the connection of thymic asthma with hypertrophy of the brain.

Causes.—Hypertrophy of the brain, or at least a condition of that organ strongly predisposing it to undue and more or less rapid augmentation of bulk, is very frequently congenital. All causes which give rise to cerebral congestion may, according to Hufeland, determine hypertrophy of the brain. Laennec, Papavoine, Rilliet and Barthez, mention an extraordinary and inexplicable effect of the preparations of lead in producing this disease; but I do not find it mentioned by other authors. Dr. Lees regards the disease as "dependent upon or connected with struma."

Diagnosis.—It is not very difficult in most cases to distinguish hypertrophy from acute hydrocephalus; not because the symptoms of the former are so very clear, but because those of the latter are generally sufficiently marked. Their acute inflammatory character, the high fever, quick pulse, and the sequence of symptoms, are very unlike hypertrophy.

Chronic hydrocephalus has more resemblance to it, and especially in the most obvious characteristic, enlargement of the head. Mauthner has thus marked the points of difference: "In hypertrophy, the posterior part of the skull first presents an unnatural prominence. In chronic hydrocephalus, the forehead is the first part to present unnatural

prominence. The altered direction of the eyes, and the very great width of the sutures and fontanelles, are likewise characteristic. In hypertrophy, children lie horizontally, or throw the head back. In chronic hydrocephalus, children lie on the belly, with the head lower than the rest of the body, burying the face in the pillow. In hypertrophy the face is puffy, the eyes inexpressive and staring, mouth half open. In chronic hydrocephalus, the countenance is withered, having the expression of premature old age. In hypertrophy, functional disturbance comes on very gradually, not before the period of dentition or weaning, and consists at first in an affection of the respiratory apparatus, difficulty of breathing, and attacks of apnoea. In chronic hydrocephalus, functional disturbance occurs early, and involves the cerebrum from the very beginning. In hypertrophy, the patient is fat and leucophlegmatic. In chronic hydrocephalus, the patient is ill nourished, subject to rickets and tabes mesenterica."*

Add to these, the projection of the parietal protuberance, observed by Drs. Münchmayer and Lees, which is not observed in chronic hydrocephalus.

Prognosis.—The prognosis is in all cases serious, not so much from the dangerous character of the disease as from the effect produced upon the brain by other causes, and its increased susceptibility to disease. There is more hope when it occurs before the sutures are ossified, and when the cranium yields readily to the increasing mass of the brain. When the skull is resisting, the result of compression may be fatal. At the same time, as Dr. Lees has observed, in the majority of cases, the *post-mortem* appearances do not throw much light upon the cause of death.

Treatment.—When the disease is fully confirmed, there appears to be no means capable of reducing the volume of the brain; and our principal efforts must be directed to guard against any attacks of congestion or inflammation, by means of leeches, cold lotions, purgatives, and counter-irritants.

But, when the disease is commencing, we ought to prohibit everything which tends to produce excitement or determination to the brain. Quiet, rest, and tranquillity of temper should be observed, cold sponging of the scalp, and occasional purgatives. The hair should be cut short, and the head kept uncovered in the house.

I do not know that iodine, either internally or externally, has been administered; but it appears to me well worth a trial, in connection with counter-irritants; or the scalp might be painted with tincture of iodine at the same time that hydriodate of potash is given internally.

The appetite, which is generally too good, should be restrained as

* British and Foreign Medical Review, No. 42, p. 389.

to the quantity of food, and that not too nutritious in quality. The moment the gums become irritable they should be lanced, and the child should take plenty of exercise in the open air.

Education must be carried on at a moderate rate, so as not to stimulate the intellect too highly; and it may be necessary to suspend it entirely at times.

When the affection results from saturnine poisons, we are recommended to employ bloodletting, opium in large doses, cold applications and evacuations, &c.

II. RAMOLLISSEMENT, OR SOFTENING.

There can be no doubt that encephalitis frequently terminates in softening, even if we admit that the latter may occur independently of the former, as in some cases of hydrocephalus already noticed, and in other cases of old standing disease of the brain (tubercles, for instance), when the neighboring tissue is softened and pulpy. These are instances of secondary ramollissement.

It does not appear that there is any symptom which positively indicates the occurrence of this lesion. Some French writers have regarded tonic contraction of one or more limbs as pathognomonic, and no doubt it frequently occurs; but it is frequently absent, and it is also met with in other affections of the brain. In most cases, we have convulsions, paralysis, and coma as the principal symptoms; sometimes a single convulsion, followed by coma; in other cases, the convulsion is repeated. Occasionally, the loss of power is the most remarkable symptom succeeding the evidences of encephalitis just noticed; sometimes the rigid contraction already mentioned, followed by relaxation and paralysis. Or there may be convulsion of one side of the body and paralysis of the other. In a case of M. Deslande's, quoted by Barthéz and Rilliet, the child exhibited a slight but continual stupor, was very easily disturbed, and died without an additional symptom. In other cases, the coma is deep and permanent until death. It is probable that softening of particular portions of the brain is attended by appropriate symptoms; but it is excessively difficult to determine this point.

Dr. Abercrombie's description partakes of his usual clear precision. He divides the cases into two classes, one in which the disease attacks persons advanced in years, and which has been so ably investigated by M. Rostan; in the other, the disease was found chiefly "in the dense central parts of the brain, the fornix, septum lucidum, and corpus callosum, or in the cerebral matter immediately surrounding the ventricles, and occurred in persons of various ages, but chiefly in young persons and children." He remarks subsequently:—"I am still disposed to contend that the ramollissement of young persons, occurring in acute affections, and seated chiefly in the central parts, is one of

the terminations of inflammations in that particular structure.”* As regards the symptoms, he considers that they exhibit no uniformity, but “the cases which terminate by ramollissement seem in general to be characterized by convulsions more or less extensive, followed by paralysis and coma, the convulsion ceasing some time before death; but in Case 27 the convulsions continued with the utmost violence till the very time of death. In Case 29, on the other hand, there was no convulsion, but a sudden attack of palsy, exactly resembling the ordinary attack of hemiplegia from other causes. In some of the subsequent cases, again, we find most extensive destruction of the cerebral substance without either paralysis or convulsion, and even without coma. In one remarkable case, to be afterwards described, viz. the last case under tubercular disease, we shall find destruction of the cerebral substance to as great an extent, perhaps, as is upon record; while the patient went to bed in the state of health in which she had been for many months before, and was found dead in the morning.” With the exception of this observation, I find nothing in this author to lead us to suppose that the disease may exist with an absence of the usual symptoms of convulsions, paralysis, or coma.

Dr. Rowland, in his Essay, enumerates all the symptoms of the disease which have ever been recorded, and gives us a comparative estimate of their value. For example, he speaks of headache being one of the earliest symptoms, but accompanied by confusion of thought, restlessness, excitement, and delirium: sometimes with a convulsive paroxysm, and afterwards with threatenings of paralysis. He remarks that, the “character of the headache is not usually acute; but occasionally it is shooting and lancinating, like neuralgia. The nature of the malady might, therefore, be overlooked, especially as the headache occurs in paroxysms, sometimes even with distinct intermissions. A careful examination will, even under these circumstances, detect the lurking evil: obtuseness of intellect, or delirium, or some feeling of weakness, or tingling in the limbs, an anxious expression of countenance, or other sign, will be observed.”† Nevertheless, I do not find any intimation given, that cases occasionally occur, in which almost all the usual symptoms are absent.

Dr. Russell Reynolds, in his valuable work on the Differential Diagnosis of Diseases of the Brain, gives a concise summary of the distinctive symptoms of cerebritis and ramollissement. He carefully points out intense pain, which often accompanies the former, and also the obscuration of the mental faculties, but he states that the stage is ushered in with convulsions. Partial cerebritis, he remarks, “resembles more the non-febrile affections;” and, so far, this is in accordance with the case I shall presently submit.

* On Diseases of the Brain and Spinal Marrow, p. 24-5.

† On Softening of the Brain, p. 35.

MM. Rilliet and Barthéz consider ramollissement of the brain to be extremely rare in children, unless where it is an accompaniment, or perhaps a consequence, of another disease, as hydrocephalus, for example, in which case they regard it as an œdematous softening; or when it is consecutive to ancient cerebral disease. They, however, quote two cases from authors, but in both, convulsions and other marked cerebral symptoms occurred.

But, by far the most satisfactory account I have met with of this affection, is contained in a paper on the subject, by M. Duparcque.* He regards white softening of the brain as a primary affection, not inflammatory, but dependent upon disordered vital action. From the five cases he has recorded, he has drawn the following general description:—" *Predisposing and determining causes*: precocious or developed intelligence, intellectual fatigue, profound or vivid moral emotions. *Positive symptoms*: headache with somnolence; integrity of the intellectual functions; exaltation of the special senses, and of the general sensibility; apyrexia, and even slowness of the general circulation. *Negative symptoms*: absence of delirium, of convulsions, of contractions; absence of stupor, of loss of intellect, of paralysis."

This summary evidently refers to a class of cases, in which we may include the one I am about to relate, and it differs remarkably from every other description of the disease I have read. One of M. Duparcque's cases, however, has such a striking resemblance to mine, that I hope I may be excused for giving a short abstract of it. The patient was a boy, aged 13, very intelligent, and at that time studying hard for a prize; he complained first of fatigue, restlessness at night, headache, which was relieved by vomiting. He returned to school, but was obliged to leave from headache and sleepiness, which continued the next day. He complained of headache, increasing in paroxysms; his intelligence was perfect; he was pained by light and sound, and sensitive to the touch generally, but there were neither convulsions nor paralysis. The skin was dry and warm; countenance calm; pulse sixty; urine scanty; tongue clean; bowels free. Considering the probable cause of the disease, and the symptoms which were referable to the brain, M. Duparcque satisfied the family that the child had cerebral fever (*fièvre cérébrale*); but as he candidly tells us, reserving to a later period the decision, as to whether it was a case of "cerebritis or of meningitis, simple or tubercular." For some days the symptoms continued much the same, no new ones being developed. The pulse had diminished in frequency in the morning, and there was a slight exacerbation in the afternoon; "little fever, little assoupissement, slight somnolence, neither contractions, convulsions, delirium, nor paralysis." Under these doubtful circumstances, Dr. Blache was

* Archives Generales de Medicine, vol. xxviii. p. 151. 1852.

called in, and reasoning "*par voie d'exclusion*," he rejected the supposition of its being either cerebritis, meningitis, hydrocephalus, or typhoid fever," and decided in favor of "nervous fever," or "nevrose cerebrale." "On the fourteenth day there was sub-delirium, stupor, agitation. It was difficult to make him speak, but he answered correctly. The eyes were turned up, the eyelids half open; the extremities became cold; the face changed; and in the night the respiration became embarrassed, sighing, and rattling; the head was thrown back convulsively, and he died. "The post-mortem examination exhibited no marks of inflammation of either the membranes or the substance of the brain, but white ramollissement of both anterior lobes of the cerebrum, particularly of the left. The limits were not defined, but the solution was greater in the centre and in front. Every other part of the brain was healthy. There were two or three spoonfuls of fluid in the ventricles, but not enough to distend them.

From even the foregoing slight sketch of what is laid down in books, we may infer, I think—1. That inflammation and softening of the cerebral substance is somewhat rare in children. 2. That it is generally said to be accompanied with pain, obscuration of the intellect, disorder of the senses, convulsions, or paralysis, or all of those symptoms, according to the severity and duration of the attack. 3. That however rare, cases have been recorded in which few, or none of these symptoms were present, and yet the patient died of ramollissement—whether inflammatory or not, may be disputed, but in which the disease appeared as a primary affection. 4. That such cases, from their rarity and the difficulty of diagnosis, possess great practical interest; and that, it is only by the collection of individual cases that we can hope to arrive at any positive conclusions.

Since the first edition of this work, the following case occurred, which I give in detail, as it illustrates the obscurity of some forms of the disease:—On Tuesday, the 21st March, I first saw A. B., aged $9\frac{1}{2}$, a little girl, of a slight, delicate appearance, with a very fair skin and red hair, and of unusual intellectual activity,—a member of a family rather obnoxious to head affections: first complained of severe headache on Monday, March 17th, 1856. We have since found reason to believe, however, that she had been unwell for more than a week, but, as she was anxious to compete in some school examination, she concealed her illness from her mother. On the Monday, however, the pain was too violent to be longer hidden, and it continued without intermission, though with aggravated paroxysms, until I saw her. During this time she slept well, and had some appetite, but no fever. She insisted upon going to school on Wednesday, and was sent home, much the worse for the exertion and excitement.

I found her in bed, complaining of severe pain and throbbing in the head (especially at the top), which increased occasionally to an almost intolerable degree. There was neither intolerance of light nor

sound at that time. Her intellect was as active and clear as usual; she spoke freely, nor did she dream when asleep. There were neither startings, convulsions, nor stupor. The pulse was 74; neither full nor feeble, but slightly irregular. She had vomited once or twice, but upon inquiry, I found that it was always after taking food or medicine; however, she took many things without vomiting; she complained of no nausea; the tongue was loaded, but furred and moist: the bowels were quite regular. The sensitive and motive powers were perfectly natural.

These were the symptoms which presented themselves; and, judging by them, I found it no easy matter to come to any decided conclusion as to the nature of the affection.

1. Of the reality and intensity of the headache there could be no doubt, and the case might be one of meningitis, tubercular or simple; or it might be a mass of tubercular matter in the brain, or of inflammation of the cerebral substance. But if so, how account for the absence of disorder of the senses, of startings, convulsions, or stupor, of fever and delirium, or paralysis?

2. If the case were the result of gastric disturbance, or were the beginning of infantile remittent, which would be consistent with the headache and state of the tongue, age of the patient, and absence of nervous symptoms, startings, convulsions, &c.; still there was no accounting for the quiet pulse, and the absence of remissions and exacerbations. Moreover, though there had been vomiting, it had only occurred a few times and when provoked, and generally the stomach was little disturbed. There was no abdominal distension, and no disorder of the bowels?

3. Could it be neuralgia? The age of the child was against the supposition; and the only argument in its favor was the deficiency of symptoms characteristic of either of the diseases just mentioned.

I found it impossible to come to any positive conclusion; and, if I have clearly described the case, it will be probably conceded to me, that the wisest thing I could do was, to suspend my judgment until the course of the disease should elucidate its nature. Meantime I treated the case, very cautiously, so as to meet the possibility of its being inflammation of the brain or its membranes. Leeches were applied, and the legs were fomented; a brisk purgative was given, followed by hydrargyrum cum creta and James's powder at short intervals.

Whether the course of the disorder did elucidate its nature, remains to be determined; but, omitting *daily* reports, I shall state merely the changes in the symptoms throughout, in a more connected, though cursory manner, premising, that the patient died on Wednesday, April 2nd—the sixteenth day of her illness.

The headache continued as bad as ever throughout the entire illness, unless, perhaps, the last two days, increasing in paroxysms, and accompanied by moaning. Still she slept very well at night, from which I

infer, that the pain must have remitted; but she almost always woke with it. The sleep for the most part was sound and natural, but one or two nights it was so deep as to resemble stupor while it lasted. Her intellect was clear throughout; there never was anything like delirium. At first she spoke freely; but as the disease advanced, she either could not or would not make the effort to speak,—I rather think the latter, as she occasionally spoke a few words quite intelligibly up to the last day; up to within an hour of her death, she evidently recognised those around her. She never had either startings, squinting, the least convulsion, or loss of power. Occasionally, but not frequently, she yawned. The vomiting ceased entirely the day after I first saw her, and never returned. There was no thirst up to the twelfth day, and no appetite; the bowels required at first a little medicine, but afterwards she was troubled with mercurial diarrhoea. The urine was secreted in the natural quantity, and of the usual appearance; but towards the end she had twice some delay or difficulty in passing it, which speedily disappeared.

The senses at first seemed more acute, both light and noise annoyed her; but, after a few days this diminished; a strong light seemed disagreeable, and throughout, although the pupils answered to the light, I should say that considering the position of her bed, facing the window, they were ordinarily more dilated than one would have expected.

The pulse, I have mentioned, was at first about 74, and slightly irregular; but this irregularity disappeared after two days, and never returned; when asleep, it was below 70. This continued up to the twelfth day, when suddenly, in the afternoon, a smart outburst of fever occurred; the skin became hot (having been quite natural previously), the pulse rose to 120, and there was great thirst. I do not think the headache was worse, and no nervous symptoms were developed. This attack lasted five or six hours, and then subsided without perspiration. She fell asleep, and in the morning I found a complete remission. The same attack was repeated on the thirteenth, fourteenth, and fifteenth days, but rather less severely each day; so that on the day she died, the prospect seemed rather less dark than previously; although the exact nature of the disease seemed, if anything, rather more obscure.

Thus, on April 2, at 9 o'clock of the sixteenth day, she took beef-tea, swallowed well, recognised those around her, and seemed unusually free from headache and fever. At 10 o'clock she suddenly became insensible, but not convulsed; the breathing became laborious and rattling; the pulse quick and weak; lips blue; countenance livid; and at 11 o'clock she died quite calmly.

However puzzled I might be to explain satisfactorily the nature of the attack, it was quite clear that there were grounds for very serious apprehension, and that the wiser plan would be to treat the case as disease of the brain, with such modifications as the symptoms

called for; and in this view I was fortunate to have the concurrence of Sir H. Marsh, who saw the patient with me soon after the commencement of my attendance, and up to the day but one before she died. We applied leeches to the head and feet, blisters constantly renewed to the neck and head; ice to the head; mustard cataplasms to the legs; gave hydrargyrum cum creta, subsequently calomel and James's powder, until diarrhœa set in, and afterwards James's powder alone, with mercurial frictions; but I cannot say that even temporary relief appeared to result from any of these measures.

Having obtained permission to examine the head, Dr. M. Collis was good enough to make the post-mortem dissection, about twenty-four hours after death. There was no congestion of the scalp, but on raising the skull, we found the superficial vessels of the brain were somewhat fuller than usual; there was no opacity of the arachnoid, no tubercular deposition, and no effusion. The substance of the brain was natural to a considerable depth, but we found the posterior portion of the great commissure of the brain, the fornix, and septum lucidum, so much softened, as to be semifluid. It was of much the usual color, neither yellowish nor reddish. A superficial layer of the corpus striatum was also softened. The ventricles contained a considerable quantity of opaline serum; and there was more beneath the arachnoid of the cerebellum, and at the base of the brain, but nowhere did the membrane exhibit marks of inflammation.

Thus we see that we may have fatal softening and effusion, with an absence of almost all the symptoms which are usually attendant on these affections; for the only permanent symptom in this case was the headache. Neither fever (at first) nor disorder of the senses or intellect, no starting, convulsion, nor paralysis, no continued vomiting nor obstinate constipation, marked the disease. Towards the end, indeed, a change took place, and then the aspect of the complaint rather resembled remittent fever than anything else.

There is, however, a very important question remaining for consideration, viz., the relation, in point of time at least, of the softening and the effusion. Was the case one of inflammation of the brain running on into softening, followed by effusion; or was it a case of arachnitis, in which the softening was a secondary consequence, as noticed by Rilliet and Barthéz? So far as we may venture to draw an inference from the history of the case, I think it is in favour of the softening being the primary disease, for we know, as in the case to which I alluded in the commencement of this notice, that ramollissement of the central nervous structure may exist with but few symptoms; whereas I believe it to be extremely rare, if it ever occurs, that meningitis should run a course of sixteen days at least, with such an utter absence of the ordinary characteristic symptoms.

My own impression is that the primary affection was inflammation of the central portions of the brain, and that the membranes participated in the morbid action, about the time when the febrile action set

in; but that the effusion did not occur until the morning of the day on which she died, and that it was the immediate cause of death.

I have seen a case of ramollisement of the cerebellum, the effect of inflammation caused by a fall, and which gave rise to very few symptoms, and those not characteristic. Frequent paroxysms of headache, vomiting, and loss of appetite; but neither impaired intellect nor muscular power, and no affection of the bladder or genital organs. The pulse was quiet, the tongue clean, and there was no convulsion.*

Pathology.—Ramollisement, as Dr. Abercrombie observes, “consists in a part of the brain being broken down into a soft pulpy mass, retaining the natural color of the part, without any appearance of suppuration, and without fœtor. This condition we often find as the only morbid appearance; but we frequently find it combined with the former (evidences of inflammation), one portion of the diseased mass presenting the deep red color, while another is in the state of ramollisement.”†

The color of the softened mass is sometimes yellow. All such cases, Rilliet and Barthéz think, are the result of secondary inflammation or softening. The consistence and extent of the softened portion vary much. It may be reduced to a kind of jelly or pulp, but without destroying the form of that part of the brain; or it may be utterly disorganized, and fluid, or semi-fluid, like cream. So we may find it of small extent, limited to a portion of the brain, or occupying the greater portion of a hemisphere. Mauthner has observed that the white substance is almost always the seat of the disease in children, the gray matter being seldom affected. The disease is almost uniformly fatal, and of very short duration.

The *diagnosis* is necessarily obscure. We may know that inflammation of the brain exists, and we may suspect that softening is taking place; but that is nearly the only conclusion to which we can attain. The sudden paralysis, especially when combined with convulsion, the loss of the power of articulation, or the complete resolution of muscular force, appear to be more characteristic than any other symptoms.

The fact that we cannot recognize with any certainty the disease during life, that all the cases on record died, will at once explain our ignorance of any efficient mode of *treatment*. I have laid down the best mode of treatment for encephalitis; but I have no additional information to give as to any change of remedies required by this termination. If the leeching, counter-irritation, and mercury have not secured the patient against this consequence of inflammation, we know not how to afford relief.

* Dublin Journal, July, 1853.

† Diseases of the Brain, p. 72.

III. ABSCESS OF THE BRAIN.

In this affection we find, according to Dr. Abercrombie, "a well-defined regular cavity, filled with purulent matter, generally lined by a soft cyst, and surrounded by cerebral matter in a healthy state."*

So few cases are on record that it is impossible to give a general description of the disease without calling in the aid of the imagination. I think it better, therefore, to quote two cases from Dr. Abercrombie's excellent work than to attempt any more formal statement.

The first occurred in a girl *æt.* 4, and the case is described by Dr. Bateman.† "An abscess was found in the posterior part of the right hemisphere, enclosed in a fine vascular sac, and containing four ounces of pus. She was first affected with convulsion of the whole body, which continued for nearly two days; during this time the left side was in a state of rigid extension, and the right was in constant motion; and when the attack subsided the left side remained paralytic. She then had headache, squinting, blindness, and repeated convulsions; and died after an illness of eleven weeks, having been comatose for only one day before her death. In some cases of this kind paralysis has occurred without convulsion, and in others convulsion without paralysis: but one or other of these affections appears to be a common attendant on the encysted abscess."‡

The next case I shall quote is that of a "girl *æt.* 11, thin and delicate, who, after having complained for some days of headache, was seized on the 11th of January, 1817, with convulsion, which continued for about half an hour. I saw her on the twelfth, and found her affected with severe headache and paralysis of the right arm, which had taken place immediately after the convulsion. The pulse was 100, the tongue foul, the face rather pale, and the eyes languid. Being bled from the arm and purged, she was much relieved. On the 13th the pulse was natural, the headache was much abated, and she had recovered considerable motion of the arm. On the 15th, the headache being increased, and the arm more paralytic, she was bled again; and on the 16th and 17th she was much relieved, the pulse natural, and the motion of the arm much improved. On the 18th, after being affected with increase of headache and some vomiting, she became convulsed, the convulsion being confined entirely to the head and the right arm. The head was drawn towards the right side, with a rolling motion of the eyes; the arm was in constant and violent motion; she was sensible, and complained of headache; pulse 100. Being bled, to ʒviij . the convulsion ceased instantly, and the headache was

* Diseases of the Brain, p. 72.

† Edinburgh Medical and Surgical Journal, vol. i. p. 150.

‡ Abercrombie on Diseases of the Brain, p. 111.

relieved, but the right arm continued in a state of complete paralysis. 19th and 20th, the arm had recovered a little motion; some headache continued, with occasional vomiting; pulse 60. On the three following days the convulsive attacks returned several times; they did not now affect the head or face, but were entirely confined to the right arm, which after the 23rd was left in a state of permanent paralysis. Hitherto no other part of the body had been affected by the convulsion, but on the 24th it attacked the right thigh and leg, and left them in a state of paralysis; pulse 60. The former remedies were again employed with activity, without any effect in arresting the progress of the disease. The thigh and leg now went through a course precisely similar to that described in regard to the arm, and on the 29th remained in a state of permanent paralysis. When the convulsion first began to affect the leg, the arm was affected at the same time; but afterwards it was confined to the thigh and leg, the arm remaining motionless. February 4.—Complete paralysis of the whole right side; no return of convulsion; she continued quite sensible, and made little complaint; pulse from 50 to 60. She now continued for several days without any change, and, except the palsy of the right side, every function was natural. She was quite sensible, appetite good, pulse and vision natural, and she made little complaint of any uneasiness. She was, however, inclined to lie without being disturbed, and gradually became more oppressed. On the 11th this had increased to perfect coma, in which she continued for three days, and died on the 14th.

“*Inspection.*—In the upper part of the left hemisphere of the brain there were two distinct, defined abscesses, containing together from six to eight ounces of very fetid pus. They were lined by a firm white membrane, and a thin septum of firm white matter separated them from each other; the one was in the anterior part of the hemisphere, very near the surface, and the other immediately behind it. They had no communication with each other, or with the ventricle. In the posterior part of the right hemisphere there was a small abscess containing about half an ounce of pus. There was no serous effusion in any part of the brain, and no other morbid appearance.*

* Abercrombie on Diseases of the Brain, p. 93.

CHAPTER IX.

TUMORS AND TUBERCLES OF THE BRAIN AND SPINAL MARROW.

BESIDES the tubercular disease of the membranes of the brain already described, we find larger and more isolated deposits of the same matter, or tumors of a different kind, growing from the membranes or imbedded in the substance of the cerebrum, cerebellum, and spinal marrow, attended by symptoms which indicate their presence but very obscurely, and having almost always a fatal termination.

This form of disease is not very common, though more frequent than was suspected, until the more accurate researches of late years by Green, Barrier, Rilliet and Barthez, West, &c. It occurs too at an earlier age, for of thirty-four cases mentioned by Barrier, sixteen were under five years; thirteen from five to ten; and five only from ten to fifteen years. Of Dr. Green's thirty cases, in thirteen it occurred between two and four years; and in seventy-five cases he states that it occurred most frequently in children from three to seven years. Of Rilliet and Barthez's twelve cases, six were from three to five years; four from six to ten and a half; and two from eleven to fifteen years; and eight were boys. Dr. Condie considers it very rare before the first year. Dr. Mauthner found, in seventeen out of thirty-two, that the age did not exceed six years, which was the case in seven out of eight cases observed by Dr. West. On the other hand, it is very rare in adults, according to Cruveilhier, Louis, and Lugol.

The sex of the child does not appear to have any influence in the production of the disease; the majority of Dr. Green's cases were females; the majority of Rilliet and Barthez's cases males.

Symptoms.—Dr. Abercrombie has observed, with great truth, that “the symptoms accompanying tubercular disease of the brain in its early stages, are often exceedingly obscure and variable; perhaps little more than a tendency to headache, which assumes no formidable character, or sometimes assumes the appearance of what has been called the periodical headache, or the sick headache. The symptoms may go on for a long time in this manner, without exciting any alarm, until the disease suddenly assumes a more active character, and is speedily fatal.”*

In five of Dr. Green's thirty cases, there was no symptom at all of cerebral disorder; in three, headache was the only symptom; in one, deafness; and in one, a purulent discharge from the ear. Moreover,

* On the Diseases of the Brain and Spinal Marrow, p. 167.

we find it extremely difficult to draw the line between the symptoms which arise from the tumor simply, and those which are the result of the morbid action which it provokes in the neighbouring tissues.

Headache is, perhaps, the most universal symptom; it may be either general or local, but in the latter case it does not necessarily mark the seat of the disease. In general it is also an early symptom, and corresponds with the remissions and accessions of the constitutional disturbance; it may continue even until death. In more cases it is absent at the commencement, and is noticed only at an advanced period of the disease.

The organs of sense are generally more or less affected; the touch the least so, however. Occasionally, at first, it seems more acute, but subsequently less sensitive, especially when the tumors are seated in the cerebellum, or near the sensitive nerves. M. Barrier mentions a case in which there was paralysis of the trifacial nerve of the right side, in consequence of the tumor pressing upon the fifth pair of nerves.* The eye and ear will be similarly affected by the pressure of the tumor in the neighbourhood of their spinal nerves, and more or less by the general disturbance of the nervous system, from cerebral tumors. Amaurosis and deafness are not uncommon; and it is, perhaps, worth noting, that in a certain number of cases there is a discharge from the ear, or an abscess of that organ,† but whether connected as cause or effect with the tubercles, it is not easy to say, but as yet I am inclined to think not.

During the early stage of the disease, and so long as it is uncomplicated, there is rarely much disorder of the intelligence. In some cases, it is true, the temper becomes irritable, especially if the headache be severe; or perhaps the child may lose its natural vivacity, and become apathetic and dull, weary of play, and wishing to be alone. At a more advanced period of the disease, even when uncomplicated, so far as we can ascertain, there gradually steals over the countenance an expression of mental feebleness and vacuity; the child is indisposed to intellectual exertion, even if not actually incapacitated. In proportion as morbid actions (meningitis, encephalitis) are excited by the tumors, we find the mind exhibit the same disturbance as is usual in these disorders.

Convulsions are by no means uncommon, though not universal; they pretty constantly occur in those cases where the tubercles occupy the central portion of the brain, or are disseminated extensively throughout. Rigidity or contraction of one or more of the extremities is more common; it generally affects the leg and arm of the same side, some-

* Mal. de l'Enfance, vol. ii. p. 630.

† Dr. Green, Med. Chir. Trans., vol. xxv. p. 193. Abercrombie on Diseases of the Brain, &c., p. 171.

times only one limb, and very rarely both upper or both lower limbs. It is not easy to determine whether it be referable directly to the pressure of the tumors, or whether it be the result of the inflammation and induration, or softening of the surrounding cerebral substance. Or perhaps we may observe a weakness of certain muscles, as in a case of Dr. Green's, where the eyeball was convulsively jerked inwards, or in other cases, in which the strabismus occurs. In the majority of cases, paralysis occurs at some period of the disease; at the commencement in a few, and at a more advanced period in most instances. It may be partial, the result of local pressure, or affecting generally the sensation and motion of one side. It is remarkable that although the child may recover partially and for a time from the affection of the eyes and ears, from the rigidity and deficient sensibility; the paralysis is permanent in almost every case in which it occurs, and continues without mitigation.

The stomach and bowels generally sympathize with the cerebral irritation, and, coincident with the headache, stupor, or coma, we find vomiting to occur; and constipation, sometimes easily overcome, but in other cases very obstinate. The circulation is generally affected, but in an uncertain manner; the pulse is sometimes slow, sometimes quick; in other cases very unequal. My friend Dr. C. Johnson attaches great value, as a pathognomonic sign, to irregularity of the pulse, occurring at an early period of the disease, and without apparent cause. So far the symptoms may be considered the result of the tubercles alone, and they do not differ, whether the seat of the tumor be the cerebrum or cerebellum; and they may persist, with intermissions or remissions of varying duration, for a considerable time, and then the child gradually sinks into stupor and coma, and at length dies. Or, which is more frequently the case, a secondary affection, meningitis or encephalitis, may be excited, giving rise to the symptoms formerly described, and masking the proper characteristics of the present affection, and proving certainly fatal. Some cases have terminated in chronic hydrocephalus, when the tumor has been so situated as to press upon the large veins or sinuses, or to offer considerable mechanical interruption to the circulation. Nine of Dr. Green's cases died with symptoms of acute hydrocephalus, and a few with those of softening of the brain.

In many cases there are tubercular or scrofulous affections of other organs, which are of value in forming a diagnosis.

The duration of the disease is very difficult to be determined; the tumors may be latent for a long time; the early symptoms are slight and undefined, and even when marked, they are common to other diseases, or occur frequently without any diseases at all. Dr. Green remarks that in his case the chronic stage varied from six weeks to two years. Rilliet and Barthez state that of twenty-five cases of tubercles with or without chronic hydrocephalus, the disease lasted in

	3 cases from 3 to 4 months.
10	„ 5 to 7 „
3	„ 7 months to 1 year.
2	„ 1 year to 2 years.
3 cases	for several years.

And the termination is uncertain, generally occasioned by a secondary complication, and more quickly than would have happened from the simple disease.

I have already spoken of the *complications*, but as they are of great importance I may as well enumerate them again. 1. Meningitis, either the simple acute or the tubercular form, not unfrequently the latter, and not unnaturally owing to the tubercular cachexia. 2. Inflammation of the substance of the brain, with (probably), first, some degree of induration, and then ramollissement. 3. Effusion of fluid into the ventricles, distending them, and compressing the brain, and constituting a simple form of chronic hydrocephalus. 4. Scrofulous or tubercular disease of the chest or abdomen, becoming active, and in its effects superseding the disease of the brain or cerebellum.

Pathology.—Tumors of the brain and cerebellum are of different kinds. Dr. Monro mentions a hard tumor of a dirty yellow color growing from the inner surface of the dura mater,* and occasionally imbedded in the brain; scrofulous, adipose, scirrhus, and encysted tumors, but they are very rare in children, with the exception of the scrofulous or tubercular.

M. Constant found that in four years, at the Hôpital des Enfants, he met with but three kinds of tumors of the brain; tubercles, cancer, and acephalocysts, and that the frequency of the first, compared with the latter, was as 40 to 1.†

Dr. Abercrombie described a tumor compressing the brain, which was formed of a “mass of pellucid albuminous matter,” lodged under the arachnoid; “it resembled much the albumen of an egg, but was much firmer, so that pieces of it could be separated from the mass, and lifted up. Parts of the mass, being thrown into boiling water, became immediately opaque and coagulated.”‡

But by far the most common kind of tumor of the brain in children consists of deposits of tubercular masses, varying in size from a pea to a hen's egg, and in number from one to fifty.§ The character of these masses is that of the ordinary tubercular matter; we often find them in a crude state, or perhaps softened in the centre,¶ generally

* On the Morbid Anatomy of the Brain, p. 45.

† Gazette Médicale, 1836, p. 487.

‡ Diseases of the Brain, &c., p. 178.

§ Dr. Green, Med. Chir. Trans., vol. xxv. p. 199.

¶ Monro, Morbid Anatomy of the Brain, p. 51.

very firm, yellowish or greenish in color, less friable than tubercles in the lungs or lymphatic glands, and in appearance like Gruyere cheese. Their form is generally globular, with irregular surfaces; occasionally, however, the shape is modified by pressure, or by the junction of several smaller masses. It has been a matter of dispute whether they possess a regular cyst, but the general opinion seems now to be that they do not, but that the appearance of cellular membrane between them and the cerebral substance is either the remains of the pia mater, or irregular unconnected shreds of cellular membrane. Barrier remarks that whenever a well-marked cyst exists, it always surrounds an ancient tumor suppurated in the centre. The tumors are generally situated in the cellulo-vascular tissue of the pia mater, and as they increase they depress the substance of the brain or cerebellum, and, as it were, bury themselves in it, except at one point, where they are adherent to the membranes. In other cases, but by no means frequently, they are formed actually in the cerebral substance, unconnected with the membranes.

The tubercles may occupy either hemisphere of the brain, or both, the cerebellum or the pons Varolii, or we may find them in more than one place in the same case. Dr. Green observes: "In the thirty cases contained in my table, the tubercular deposit existed eleven times in the hemisphere of the cerebrum, nine times in the cerebellum, seven times in the cerebrum and cerebellum together, and twice in the cerebellum and pons Varolii together. I have, however, notes of two cases in which the tubercle was confined to the pons Varolii.

So much for the tumors themselves; but as a careful analysis shows that the more marked symptoms, especially in the more advanced stage of the disease, arise rather from morbid conditions of the surrounding brain or membranes than from the mechanical pressure and irritation of the tumor, it is of great consequence to notice these conditions. In some rare cases no change could be detected in the membranes of the brain, but in the majority there are decisive evidences of inflammatory action. The membranes may be thickened or injected, and adherent to the cortical substance, and simple or puriform fluid effused. The surrounding cerebral structure may be injected and softened, but superficially, or the softening may be extensive and deep, with evidences of inflammation* or without. In some rare cases the surrounding substance is fuller and more firm than usual, as if slightly indurated; in others it appears hypertrophied. Lastly, the ventricles are sometimes largely distended with fluid, as in chronic hydrocephalus, the consequence, most probably, of mechanical obstruction to the circulation, occasioned by the pressure of the tubercles.

Causes.—No doubt the deposit of tubercle in the brain depends

* Moncrieff's case in Monro on Morbid Anatomy of the Brain, p. 51.

upon the same state of constitution as that which occasions its presence in the lungs or any other organ, and beyond this we know little or nothing. There must be some peculiar cause, certainly, for its greater frequency in children than in adults; for whilst Cruveilhier, Louis, Lugol and Abercrombie afford testimony to its rarity in adults, Dr. Green found it once in every fifty-one cases out of 1324 admitted into the Children's Hospital; and the testimony of Barrier, Constant, Rilliet and Barthez, &c., confirms this fact. Scrofulous diathesis, hereditary predisposition, and age, therefore, all appear to aid in determining the deposits of tubercular matter in the brain, and this is really all our positive knowledge of the subject.

Diagnosis.—After the description I have given, I need hardly say that the diagnosis of tubercles, or tumors of the brain, in children, is extremely difficult, not only from the absence of any very characteristic symptom, but from the irregularity and distance of the symptoms which do arise. In general we can only arrive at a presumption by carefully collating all the symptoms, their sequence and relation, with the history, habits, and constitution of the patient. Dr. Charles Johnson, relies much upon the occurrence of irregularity of the pulse at an early period, when other symptoms which might explain it are absent. The most common and best marked symptom is the headache, which is either persistent or in paroxysms, and often circumscribed, together with emaciation, without apparent organic disease. But it may be months before any other decided evidence of cerebral disease is developed. Dr. Adams mentions scrofulous habit, paroxysmal headaches, vomiting, convulsions, muscular tremors and weakness of the limbs, with variations in the pulse, as the principal diagnostic symptoms. "When, however, a child has suffered for some time from severe headache, when the headache is followed by convulsive movements, some paralytic affection, amaurosis, contraction of muscles, occasional vomiting, accesses of fever, and the train of symptoms already mentioned, and when these symptoms succeed each other at various intervals of weeks or months, we have very great reason to believe that the child has tubercle of the brain."*

M. Rilliet finds his diagnosis of cerebral tubercle upon the following general considerations: 1. The age of the child, the disease being much more frequent after than before the age of three years. 2. The circumstances which preceded the attack, and particularly the causes under the influence of which the disease was developed. 3. The state of health at the period of invasion. 4. The primary symptoms, as convulsions, lancinating headache (continued or intermitting), paralysis, amaurosis, and much more rarely, rigidity. 5. Lesions of the cranial parietes, exophthalmia, nasal or auricular discharge coinciding with cerebral symptoms, or having been preceded by continued vomit-

* Dr. Green, Med. Chir. Trans., vol. xxv. p. 207.

ing. 6. The chronic progress of the symptoms; for time alone will sometimes discover the nature of the disease. Chronic symptoms with reference to motility are more to be depended on than disorders of the intellect. 7. It is necessary to keep in remembrance the great frequency of tubercular disease in childhood and the infrequency of other kinds of chronic cerebral disease.

Still more difficult is it to determine the locality of the tumor; certainly the pain is often limited and fixed in one spot, as, for example, at the occiput when the tumor is in the cerebellum, and in some cases it has sufficed for a direct diagnosis; but it is by no means certain; the pain is often too general, and when localized it has been found not to correspond with the seat of the tumor.

The pressure of the tumor upon some spinal nerves, or origins of nerves, may give rise to symptoms which explain their source, but these cases are very rare. In like manner the symptoms which arise when the tumor is seated in the spinal cord possesses more peculiarity, as we shall see presently.

As to our distinguishing between different kinds of tumors, all we can effect is a calculation of probabilities. We have the evidence of M. Constant, already quoted, that tubercles are forty times as frequent as any other tumor of the brain in children; and if, in addition, we can ascertain the presence of the scrofulous diathesis, the presumption will be altogether in favor of tubercle.

The *prognosis* is, in all cases, unfavorable. Almost all die, either of the wasting and suffering caused by the tubercle, or of some cerebral disease excited by it. Yet neither can we say that tubercles are absolutely incurable, for there is evidence that they may be arrested, absorbed, or transformed at an early period. In a case of M. Leguillon's, quoted by M. Barrier, the child showed symptoms of tubercles four years before its death, and after death they were found to have become calcareous.

Treatment.—In so hopeless a disease little is to be expected from treatment, and on that account, perhaps, too little effort has been made to afford relief. So long as we have to deal with the effects of the tumors simply, our chief remedy is counter-irritation employed pretty freely. Gendrin thinks that it is used too timidly, and has failed in consequence. He advises large moxas to the temples, to the neck, behind the ears, &c. I really think that a succession of blisters to the head, and a seaton or issue in the neck or arm, will be found as useful and far less painful. The general treatment of tubercles must also be adopted; and it may be worth while, at an early period, to give iodine a fair trial.

But when secondary affections arise, such as acute meningitis, chronic hydrocephalus, &c., the treatment will require modification, and it may be necessary to adopt more active measures. The treatment I have already laid down for these diseases will be proper, in a minor degree, however, under these circumstances, proportioning

it to the violence of the disease, the strength and constitution of the child, &c. The diet should be light and nourishing, but not stimulant; and the child should, at an early period, be much in the open air.

I have mentioned that tubercles are occasionally developed in the *spinal cord* or its *membranes*. Ollivier has recorded a considerable number of cases,* and he remarks that although there are cases on record where the tumor occupied the lower portion of the spinal marrow, yet that they are much more common in its superior portion. The symptoms in many cases are as few and obscure as in tubercle of the brain; in others we find convulsive movements, contraction, epilepsy, feebleness of limbs, loss of sensibility, retention of urine, constipation, &c. &c.

A certain amount of disturbance is due, doubtless, to the mechanical pressure of the tubercle, but still more to the congestion, inflammation, and softening of the surrounding tissues, which are observed in the spinal cord, just as we found them in the brain.

My friend, Dr. Geoghegan, of this city, has recently published† a very interesting case of a scrofulous tumor in the lower portion of the spinal column, some of the details of which I am tempted to extract, in the absence of any systematic statement of this disease. "A boy, æt. 7, of tolerably healthy appearance, was admitted into the City of Dublin Hospital in September, 1847, labouring under well-marked paraplegia, and who presented the following conditions: Complete paralysis of sensation of the lower part of the body, commencing at a point a little above the upper margin of the pelvis; severe pinching, or the introduction of a needle, not eliciting the slightest indication of pain. Complete loss of voluntary motion of the same parts, except of the muscles concerned in the abduction and rotation inwards of the thighs, which retain a very slight degree of power. The muscular contractions depending on excito-motory power in the paralyzed parts are extremely well marked; pinching of the integuments of the legs, thighs, scrotum, penis, and lower part of the abdomen, producing abrupt motion, chiefly in the flexion of the leg. These effects are most intense when the stimulus is applied to the integument of the penis or scrotum. When the soles of the feet are tickled, the legs are retracted. Marked motion of the lower extremities is also produced on pressing on the sacrum. The feet are cold, and the legs and thighs somewhat flexed and rigid, conditions which increased as the case progressed. There is incontinence of urine and feces, the former of which, it is stated, did not immediately follow the paralysis of the limbs. The sphincter ani,

* *Traité de la Moelle Epiniere*, &c., vol ii. p. 272.

† *Med. Press*, March 8, 1848.

when in repose, is closed, and grasps the finger moderately when introduced within it. Irritation of the integument covering the sphincter produces abrupt contraction of the muscle. There is stillicidium of urine, which is converted for a few moments into a stream, when the boy is placed on his face. On one occasion the catheter having been introduced after the patient had been lying on his back, two or three ounces of turbid, faintly acid urine, admixed with pus globules, were withdrawn, the operation producing partial erection of the penis. The fluid removed became putrid and ammoniacal in three hours afterwards." A little precaution prevented the recurrence of this condition of the urine. "On examination of the spinal column, with a view to the detection of the cause of the preceding phenomena, no deviation from its natural figure was discernible. From about the fifth to the eighth spinous process of the dorsal vertebræ, tenderness is evinced on percussion, but not on firm pressure. The functions of the brain are perfectly natural; the child, however, seeming more lively than is usual at his age. It appeared that since last April this patient had suffered from uneasiness in the back, in the situation of the tenderness, although, from his silent habit, he did not complain of the pain; he used frequently, however, to place his hand on the affected part. About the latter end of September his legs were observed to drag in walking, and pains in his lower limbs were experienced. While out airing he suddenly stopped and fell, but is reported to have walked home with little assistance, and also to have gone to bed without help. Next morning it was discovered that he was perfectly paralyzed in his lower limbs." Dr. Geoghegan came to the conclusion that either a tumor existed in the spinal cord, or that the investing membranes were considerably thickened. Issues were introduced, and iodide of potassium given, with a generous diet and attention to the bowels. For some time the symptoms continued the same, with emaciation; but "about the early part of January symptoms of cerebral disturbance manifested themselves; frontal headache, stiffness of neck, and retraction of head; slight dilatation of pupils, which were contractile, but oscillating under the appearance of a fixed current of light; slowness and irregularity of pulse; incapacity to answer questions; although volition, in its minor grades, is still capable of being roused, either through the intervention of common or spinal sensation: in a word, symptoms of effusion within the head were manifest. Notwithstanding suitable treatment, he sank about the middle of the month." On dissection there was observed moderate venous congestion of the brain, with some effusion; the upper part of the spinal cord, as well as the brain, was free from disease; but "at a point corresponding to the tenth dorsal vertebræ, before the theca was divided, a very perceptible enlargement of the spinal cord was discovered." "On dissection of the diseased portion, it was observed to be of a light, sulphur-yellow color, having much the aspect of matter often found in scrofulous

glands, containing a few minute cavities, and having embedded in its lower parts a distinct reddish-gray mass, about the size of a pea. The tumor, generally examined by a lens, possessed a coarsely granular texture, and throughout the greatest part of its length had completely supplanted the natural texture of the cord; but, from its oblong oval figure, its upper extremity and the superior part of its lateral surfaces were invested with a thin coating of nearly healthy medullary texture. The mesenteric glands were enlarged, internally of a reddish-gray color, and gray externally. The lungs contained a considerable quantity of crude tubercles. The rectum was natural, and the urinary bladder contracted and empty; its mucous surface not thickened or ulcerated, and presenting livid patches of venous submucous congestion. The total thickness of its coats, a quarter of an inch."

It is more than probable that any treatment will fail in relieving this form of disease; but as it is our duty to make a trial, there appears more hope from counter-irritation, iodine, and due attention to the stomach and bowels, than from any other plan.

CHAPTER X.

CONGESTION AND APOPLEXY OF THE BRAIN.

I HAVE already alluded to an effusion of blood which takes place between the cranium and dura mater during parturition, under the term "subcranial cephalæmatoma," the effects of which are manifested shortly after birth, and which generally terminates fatally. Of eight cases collected by Dr. West, two were stillborn, one died on the fifth day, two on the ninth, and two on the twenty-first.

I have now to direct the reader's attention to effusions occurring after birth, from the age of one or two days up to the period of puberty; and I may remark that, whilst the disease is more frequent than has been imagined among children, it appears more common at an early age than subsequently.

Dr. Evory Kennedy and Dr. Doherty have related several cases in which it occurred a few days after birth.*

* Dublin Journal, vol. x. p. 421; vol. xxxv. p. 49.

Dr. Condie mentions that during the thirty-eight years preceding 1845, there occurred in Philadelphia sixty-nine deaths from apoplexy in children under ten years of age, viz: in those under one year, twenty-seven cases; between one and two years, sixteen; between two and five, fourteen; and between five and ten, twelve.*

Rilliet and Barthez give thirty-eight cases: four under two years; ten between two and three; six between three and five; six from five to seven; three from nine to ten; and seven from ten to fourteen years of age.

It occurs both in children apparently healthy, and in those of debilitated constitutions.†

As in adults, we find different degrees of morbid action giving rise to nearly the same symptoms and similar results.

1. We find that a child may die of apoplexy apparently, and on making a *post-mortem* examination we may discover nothing but excessive vascularity of the brain or membranes resulting from congestion.

2. If the congestion of the membranes be carried to a very great extent, the blood escapes drop by drop, or exudes into the cavity of the arachnoid, or into the ventricles, giving rise to the variety called by M. Serres *apoplexie meningienne*, and which comes next in frequency to the congestive apoplexy, and occurs chiefly between one and five years of age.

3. When the vessels which supply or permeate the texture of the brain are subjected to great pressure by the accumulation of blood, their tunics may give way, and the blood escape into the substance of the brain, constituting the ordinary apoplexy of advanced life. This variety is more rare than the others, and is generally observed a few years later.

I. Let us first consider the *congestive apoplexy* of young infants. It cannot be a matter of surprise that the vascular action of the brain in infants should be liable to violent and extreme disturbances, nor that these irregularities should act powerfully upon that organ; the difficulty is to explain why mischief does not more frequently result.

The attack is generally sudden, but in some instances we find it preceded for a few days by a disorder of the stomach and bowels; or it may occur in the course of some other disease, as ramollissement of the brain, whooping-cough, &c., or after convulsions. Barrier mentions its occurrence in a case of general œdema.

The symptoms are, more or less complete stupor, lividity of the face, which appears tumid, contraction and insensibility of the pupils, laboured respiration, hemiplegia, or occasionally rigidity of the neck and

* Diseases of Children, p. 388.

† Cases by Quain, Lond. Journ. of Med., No. 1, p. 27.

lower extremities, and sometimes convulsions. If not relieved, these symptoms increase in intensity, and the child dies comatose.

M. Constant relates the case of a girl who died thirty hours after admission into the hospital, apparently from hemorrhage into the brain. There was loss of power in all the limbs, insensibility, loss of intelligence, and stertorous breathing. On dissection, nothing but extreme congestion of the brain was discovered.*

When the congestion is confined to the spinal marrow, the symptoms are nearly the same; convulsions are more frequent, there is great drowsiness or stupor, the corners of the mouth are drawn downwards, and sometimes the arms are pressed close against the side, or paralysis may occur.

II. *Meningeal apoplexy*, which constitutes one-third of the causes of death in stillborn infants, according to Cruveilhier,† occurs also after birth, during the first few hours or days of life, as well as subsequently. It is not easy to explain why it should occur previous to birth in many cases, for in them there has been neither undue pressure in the use of instruments nor undue delay in the expulsion of the body after the transit of the head; but in other cases it sometimes happens that after the head is born the uterine contractions cease for a time, and then the veins of the neck are compressed by the external orifice, and the cord by the body of the child against the walls of the pelvis; the face becomes livid, purple, almost black, and if the infant be not quickly extracted it may die of apoplexy. The same result may occur in breech, footling, or funis presentations.

The symptoms which are developed in young infants some time after birth are very like those of inflammation, and may easily be mistaken for them. M. Legendre, who has carefully investigated that subject, remarks: "After two or three vomitings, or even without previous vomiting, the infants were attacked with fever and some convulsive movement, most frequently of the globe of the eye, and having some degree of strabismus; the appetite was lost, thirst great, the evacuations natural or easily excited. Soon after, there was permanent contraction of the feet and hands, followed by tonic or clonic convulsion. During the convulsions, sense and sensibility were abolished, and the face, ordinarily congested, became of a deeper color. During the intervals there was drowsiness and stupor, which, slight at first, increased as the disease made progress; the fever continued, and became more intense as they approached the fatal termination. Lastly, the convulsions, at first more or less distant, became more and more frequent, and, during the last period, almost constant."‡

In other cases, the incursion is more sudden and marked; the child

* Gazette Médicale, 1835, p. 572.

† Anat. Path. liv. xv. p. 1.

‡ Bouchut, Mal. des Nouv. nés, p. 468.

becomes suddenly drowsy, stupor and coma come on, convulsions or paralysis and death follow rapidly. The difference of symptoms and their intensity will depend very much upon the amount of effusion. In some cases, convulsions are almost the only symptom observed, as is stated by Dr. Schleifer to have been the case in the Foundling Hospital at Prague. Paralysis is much less frequent. M. Legendre met with it once in nine cases, and Rilliet and Barthez once in seventeen.

The course of the disease depends a good deal upon the amount of effusion. When it is great, and has been quickly effused, speedy death is the result. And, no doubt, the great majority of all cases die; but, whilst very few indeed recover, the disease changes its character in some cases, and becomes chronic. In young infants, before the skull is completely ossified, a proportionate amount of distension may take place, and the brain, relieved of some of the pressure, to a certain extent becomes accustomed to and tolerant of the remainder, the effused blood separates into its two portions, the more solid is partially, at least, absorbed, the fluid rather increased, a sort of cyst is formed around it, and the child exhibits the symptoms, not of apoplexy but of chronic hydrocephalus, except that the head is more unequally enlarged, running the same course, and ultimately proving fatal.

Both the acute and chronic forms of the disease, however, are very often shortened by secondary attacks of thoracic or abdominal inflammation. This was the case with most of M. Legendre's cases.

III. *Cerebral apoplexy*, or effusion of blood into the substance of the brain, is much more rarely observed. Guersent states that he saw but two cases in twenty years' practice. Becquerel mentions that in three years, and among four hundred autopsies, he has not met a single case of simple hemorrhage into the cerebral substance.

Some cases, however, have been recorded. M. Rochoux, in 1833, had collected eight cases, one by a physician at Breslau, and one by M. Guibert (æ. 14); one by M. Payne (æ. 12); one of a child exposed to the sun, by M. Andral (æ. 12); another of a child who, after being exposed to the sun, died suddenly (in a fit of anger) from hemorrhage into the cerebellum; one by Tonnelles (æ. 2); one by Burnet (æ. 1); and one by M. Serres (æ. three months). Since then, Lallemand has related the history of one case (æ. 3) in his third letter, and M. Constant of another (æ. 11).* MM. Sesté† and Cazalis have recorded three, M. Valleix three cases,‡ M. Billard one, and Dr. West one case.§

* Gaz. des Hôpit. des Enfants, April, 1841.

† Bull. de la Soc. Anat. 1832. Bull. xlii. p. 331.

‡ Clinique des Mal. des Enfants, p. 575.

§ Lectures. Med. Gaz. June 18, 1847, p. 1062.

But hemorrhage into the brain may be the result of, or at least connected with ramollissement, and these cases are by no means so rare; for instance, M. Becquerel met with four such.

It appears that this form of the disease is not limited to any peculiar age; it has occurred as early as three months, but it seems more frequent in children after three years.

The symptoms do not differ very widely from those observed in adults laboring under the disease. There may be previous headache, heaviness, and drowsiness, or the attack may be sudden, and marked by stupor, coma, convulsions, or paralysis. The symptoms are more obscure in delicate children, as Valleix has remarked; the stupor and loss of power being present in all. Nor does there appear to be any special symptoms indicating whether the effusion is into the substance of the brain or the arachnoid. Of course in cases of tubercles or ramollissement, the symptoms of these diseases will be present, and those of apoplexy merely an addition to them.

Pathology.—When a child dies of apoplexy from excessive *congestion* merely, we find on examining the head, that the scalp is unusually vascular, the sinuses of the dura mater filled with blood, and the vessels on the superficies of the brain engorged. Very commonly the meningeal vessels participate in the general congestion. I have seen the former the size of small leeches, with the blood partly fluid and partly coagulated. On slicing the brain, innumerable red spots appear, indicating that the vessels which permeate the substance of the brain are equally the seat of unusual distension, and even so much so as to give a reddish color to the brain.

In *meningeal apoplexy*, the effusion is into the cavity of the arachnoid; most frequently, according to Cruveilhier, limited to the cerebellum, sometimes surrounding the posterior lobes of the cerebrum, and occasionally both the cerebrum and cerebellum are covered with a layer of blood. Rilliet and Barthez state that it is more frequent on the convex surface of the brain. It is very rare that the hemorrhage takes place into the ventricles; however, Cruveilhier met with three examples of it; M. Valleix with one; and M. Walther has recorded another.* Still more rare is it for the blood to be effused external to the arachnoid, either on the side of the pia mater or the dura mater, although I have already mentioned the occurrence of the latter; and I may add that in very young infants who die of apoplexy, it is by no means uncommon to find cephalæmatomata, or even patches of blood effused under the scalp or pericranium, quite independent of local pressure.

The blood effused into the serous cavity presents different aspects, and undergoes different changes, according to the period which may elapse after its escape. At first it is, of course, fluid, but about the

* Ranking's Abstract, vol. iii. p. 159.

Fourth or fifth day it coagulates, the serum is absorbed and gradually disappears, and the clot becomes adherent to the parietal serous membrane, and undergoes an important transformation. A new membrane is formed, and covers both its surfaces, but the layer on the upper surface gradually becomes thinner, until it is closely adherent to the serous membrane; the inferior layer assumes all the character of a serous membrane, and is united to the arachnoid at the circumference of the clot, giving to the latter the appearance of subserous effusion. That this is not the case has been demonstrated by M. Baillarger, who has proved that the true serous membrane can be traced behind the clot.* The clot increases in firmness and diminishes in volume by the gradual absorption of its serum. At first of the usual red color, it becomes paler by degrees, more slowly internally than externally, and at length is little more than a thin fibrinous lamella of a fibrous character, resembling in appearance false membrane, which has led to its being attributed to inflammation.

In other cases to which I have already alluded the membranes form around the clot, and the more solid portion is absorbed, leaving in the species of cyst so formed nothing but reddish serum, thus constituting a kind of chronic hydrocephalus.†

Notwithstanding the large amount of blood thus effused, it is generally quite impossible to detect any opening in the vessels from which it could have escaped; we merely find unusual congestion of the arachnoid, pia mater, and brain in most cases. M. Piedagnel mentions three sources: 1. Fracture and rupture of the vessels; 2. Exhalation; and 3. A morbid alteration of the arachnoid. Although in some few cases the arachnoid in connection with the clot is softened, it appears to have occurred subsequently to this effusion, and is even more rare than rupture of a vessel.

Other organs participate in the hemorrhagic diathesis also; it is not very rare to find ecchymosis, or effusion into the lungs, spleen, intestines, &c. We do not find the brain either hypertrophied or the convolutions flattened. If the child be young, and the effusion great, the cranium expands in proportion; if it be older, and the effusion great, death results immediately.

Cerebral apoplexy may present either of two pathological conditions, first, in the form of innumerable bloody points, the size of pins' heads, in the gray and white substance of the brain. These are, in truth, small clots, and may be enucleated quite easily; the brain around them may be quite healthy, or it may be softened, and of a white, yellow, or red color. The apoplexy may be limited, or it may be diffused throughout the hemisphere, giving to it a peculiar spotted appearance.‡ Ril-

* Bouchut, *Mal. des Nouveaux nés*, p. 466.

† Rilliet and Barthéz, *Mal. des Enfants*, vol. ii. p. 39.

‡ Valleix, *Clinique des Mal. des Enfants*, p. 594.

liet and Barthez found this capillary apoplexy limited in five cases and diffused in three.

Or, secondly, the blood may be effused into the substance of the brain, and form a coagulum, and this occurs about as frequently as the former kind, and sometimes in combination with it. These apoplectic foci are found in various parts of the brain, as in the optic thalami, corpora striata, and in either hemisphere, but in the left oftener than in the right, and in the cerebellum not less frequently than in the brain. If the case be recent, the blood will be found in a fluid state; but if of longer standing, it becomes coagulated, and is imbedded in, but distinct from the cerebral substance. When it is connected with ramollissement, however, it has the appearance of being mixed with the softened brain, and does not, generally, form a distinct clot. Rilliet and Barthez relate a case of very extensive effusion, which, in some degree, illustrates the observation; and Billard another, of a child who died on the third day after its birth, of hemorrhage into the left hemisphere. He found a certain degree of softening around the clot, but it would seem to have been rather the consequence of the effusion.

Causes.—Rilliet and Barthez thus enumerate the causes of apoplexy: 1. The untimely cure of diseases of the scalp; 2. Diseases of the sinus of the dura mater; 3. Compression of the vena cava superior by the bronchial glands; 4. Vascular compression, owing to hypertrophy of the abdominal organs; 5. Cachexia, or general debility, originally connected with tubercularization; 6. Sometimes the hemorrhage is primitive and unconnected with any anterior disease. In one of M. Valleix's cases, he attributed the apoplexy to the obstruction offered by coagula to the return of the blood.

In new-born infants, apoplexy may, perhaps, result from some injury connected with labor, although we are not able to appreciate it at the time, and at a later period to diseases which obstruct the return of the blood from the head, as hooping-cough and perhaps disease of the valves of the heart.

Diagnosis.—There is so much uncertainty in the symptoms of apoplexy in infants and children, sometimes one and sometimes another predominating, and most of those which are present occurring in other cerebral diseases, that the differential diagnosis is, in many cases, extremely difficult. For example:—

1. *Congestive apoplexy* may very closely resemble primary convulsions, and, in fact, may be no more than an exaggerated form of the same disease; but in general we find that the functions of the brain are restored more completely between the fits in the latter case. In apoplexy, on the contrary, the child is drowsy and heavy, or lies in a state of stupor or coma.

2. *Meningeal apoplexy* may resemble acute meningitis when the effusion is moderate, or chronic hydrocephalus when considerable, and especially when the cyst of serum is formed, as I have mentioned. In acute meningitis, the symptoms exhibit more of the character of in-

flammation; in apoplexy, of compression; and the incursion of the latter is generally more sudden, and the destruction of voluntary power more complete; the pulse, too, is less affected, and there is little or no fever. Chronic hydrocephalus is of slower development, a series of symptoms, generally preceding the enlargement of the head, or those evidences of compression which present themselves when the sutures are ossified; in meningeal apoplexy, on the contrary, symptoms of effusion generally precede all others, although some time may elapse before the head is perceptibly enlarged.

3. *Cerebral apoplexy*, if slight, may be mistaken for an attack of convulsions, or of epilepsy, but it will generally be found that the convulsion is less violent, shorter, and that the patient does not recover from it so completely. The stupor, coma, insensibility, and paralysis which follow a larger effusion, and the rapidly fatal progress of the disease, are quite characteristic, and are in no danger of being mistaken for any other disease, unless, perhaps, the water-stroke. When there is simple hemiplegia, we can have but little doubt of the case being one of apoplexy, but when convulsions occur, they tend much to confuse the diagnosis. We should, however, always bear in mind that the diseases with which apoplexy may be confounded are much more frequent than the latter; that the causes of the former are generally more patent, and the series of symptoms, the whole aspect and physiognomy of the case, are widely different to an experienced eye.

Prognosis.—Nothing can be more serious than the prognosis in apoplexy. From the congestive form of the disease, no doubt, children who are promptly treated have a tolerable chance of recovery, but meningeal and cerebral apoplexy almost always prove fatal. There is scarcely a case of cure on record, either of primary, secondary, or chronic apoplexy, in which any reliance can be placed; not from deficient veracity on the part of the writers, but from doubtful diagnosis.

Treatment.—When the case is recent, and, above all, if we have reason to believe it one of congestive apoplexy, we should have recourse to bloodletting immediately, either from the arm or jugular vein, or by leeches. The effect of this proceeding will probably determine the correctness of our diagnosis, for if the symptoms have been the effect of congestion merely, they will at once be mitigated, and the more alarming ones disappear. Judging from the result, we may find it advisable to repeat the leeches, and to have recourse to cold applications to the head, purgative enemata, small doses of calomel and James's powder, if the patient can swallow, and, after a short time, to successive blisters to the head or nape of the neck. Should we see any disposition to a return of the congestion, in addition to a repetition of these remedies, it will be necessary to establish some permanent counter-irritation, either a seton or issue, or perpetual blister on one arm.

If effusion have already occurred, it may be very right to try the above remedies, although we shall probably find but little amendment

follow ; the disease will run its course, nearly unmodified by our efforts, and terminate, in the great majority of cases, fatally.

But should the case be one of meningeal apoplexy, and take on a chronic character, distending the cranium, as in the cases described by M. Legendre, we shall have an opportunity of trying how much (or rather how little) treatment can effect for the patient. For this purpose we have four remedies of great value, calomel, cold lotions, counter-irritation, and purgatives. The calomel should be given in small doses, guarded so as not to affect the bowels too quickly, and should be continued until the constitution is affected, as will be evidenced by mercurial diarrhœa or soreness of the gums. Mercurial inunction may be used, or the blisters dressed with mercurial ointment, for the purpose of more rapidly affecting the system, or in case the calomel should excite irritation.

The hair should be removed, and an evaporating lotion constantly applied.

I have always found that a succession of small blisters acted more beneficially than one or two large ones, besides being less liable to ulceration. I would recommend, then, that we should begin by applying a blister to the forehead, then, in a day or two, another to the temple, followed by a third on the opposite side, and so on.

The bowels should at all times be kept free, but after we remit the mercury we may try the effect of a brisk purgative occasionally.

I mentioned before, that if there should be any sign of teething, the gums should be scarified deeply, and all round.

The diet in all cases should be mild and unstimulating, but in some cases a better diet will be necessary, as well as the use of tonics. This will depend upon the state of the constitution.

In these latter cases of which I have been speaking, *i. e.* where a large quantity of blood has been effused and separated into its component parts, without an immediately fatal result, Rilliet and Barthez recommend that the serum should be removed by puncture, as in chronic hydrocephalus. They oppose the practice in the latter disease, because the effusion may be connected with tubercular deposits, but in meningeal apoplexy they conceive that "nothing but good can result from it."

CHAPTER XI.

PARALYSIS.

PARALYTIC affections, general, partial or local, particularly the latter though not very frequent, are by no means rare in children. That they have not been more distinctly noticed by writers may have arisen from their classing them under their various causes, instead of regarding them as examples of a special disease.

The attack presents great varieties as to extent and the accompanying symptoms: In some cases the upper and lower extremities of one side are affected, constituting hemiplegia; in others both the lower extremities, paraplegia: but I am not aware that both the upper extremities alone are often paralysed. Again, the seizure may be partial, loss of power to a great extent, with perhaps a diminution of sensation, but not absolute paralysis: or it may be local, affecting a portion of the one extremity, certain muscles of the face, of the eye-balls, eyelids, or of the organs of deglutition, &c.

M. Chassaignac has described a variety of paralysis occurring in very young children. It is chiefly confined to the upper extremities, occurs instantaneous, with acute pain. The power of motion is nearly lost, but not so the sensibility; and moving the limb gives great torture. The disease disappears nearly as suddenly as it came on.*

Lastly, in any of these cases, the sensibility may be impaired or destroyed, or, as we occasionally find, unaltered or even increased. In seven out of eighteen cases given by Dr. West, "the leg only was affected, and in two of these the power over both legs was lost; in five both the leg and the arm were palsied, while in six instances facial paralysis existed. In four of these six cases the paralysis of the portio dura was not associated with impaired power over any of the limbs; once it was combined with palsy of the leg, and once with general impairment of the power of walking."†

There does not appear to be any age exempt from these attacks; infants at the breast or children of fourteen or fifteen years of age may be the subjects of them, but they are perhaps more common from the period of the first dentition up to the tenth year. There is some reason to believe that in some cases the paralysis is congenital, whether from disease *in utero*, or from pressure during the transit of the infant

* Archives Gen. de Medicine, June, 1856, p. 653.

† Diseases of Infancy and Childhood, p. 137.

through the pelvis, it is difficult to determine. Professor Robert Smith, of this city, brought before the Surgical Society several cases where one extremity was not fully developed, and in which there was a deficiency of cerebral substance in the opposite hemisphere of the brain, but whether they ought to be considered as fair examples of paralysis, or merely of arrest of development, may be a question.

Dr. Evory Kennedy, whose experience in the Lying-in Hospital was very great, states that "paralysis in the new-born infant is not a very unfrequent disease; it may occur as the effect of injury to the nerve in the part paralysed, or in its course after its transmission through the cranial or spinal aperture. Examples of this we have in injuries to the portio dura, as in face presentations, or when the head has been long pressed against the projecting ischiatic spines. Several cases of this kind have occurred to me, in which the disease was quite local, the paralysis being removed on the subsidence of tumefaction produced by the protracted pressure."* In most cases, however, Dr. Kennedy mentions that the paralysis is connected with cerebral or spinal derangement; in some preceded by apoplexy, in others by convulsions, or convulsions of the opposite side may co-exist with paralysis. Sometimes the affected limb was convulsed; in other cases, there was a more or less complete paralysis of one side, with a partial paralysis of the other. Cases illustrating these varieties are related by the author. Leeches, stimulating frictions to the spine, and calomel, appear to have been very successfully employed.

More recently, Dr. Landouzy has published a paper showing that facial paralysis may be the result of pressure by the forceps during delivery, even though the instrument may have left no marks upon the infant; and he considers that the same result may follow when the pressure is from pelvic tumors or deformity; and he states that during quiescence the face is quite natural, but that when the child cries the paralysis becomes evident. He found the disease to cease spontaneously after an interval of from a few hours to two months.†

Dr. Doherty, in an excellent paper,‡ gives two cases which were delivered by the forceps, and in which facial paralysis was observed immediately afterwards; and two other cases, in one of which paralysis of the arm and in the other of the muscles of the neck occurred shortly after birth. The former was cured by the use of mercurial alteratives, continued purges, the douche, and chalybeate tonics.

There can be no doubt, then, that facial paralysis may be congenital, and as little, I think, that more extensive paralytic affections are so occasionally. Dr. Henry Kennedy has given two cases which he thinks

* On Apoplexy and Paralysis in New-born Infants, Dublin Journal, vol. x. p. 430.

† British and Foreign Med. Review, vol. x. p. 269.

‡ Dublin Journal, vol. xxv. pp. 85-87.

were congenital. One of them he relates as follows: "A child, æt. six, was brought to me on account of his walking lame. The mother said that from the time the child began to walk it had limped; several medical men had seen it, but that it was no better. On examination, the right lower extremity was wasted, and its temperature was evidently lower than the other. Nothing could be detected wrong with any of the joints except that they could literally be twisted in every direction."* Dr. West also mentions cases, which one can scarcely doubt were congenital.

In all these cases, the growth has evidently been checked and retarded; the affected limb has not kept pace in volume or length with the sound one, and its power is much inferior. I have a case under my care at present somewhat resembling these, but with less loss of power. The child, æt. fifteen, had an attack of endocarditis about twelve years ago, from which he recovered, but with injured valves. About two years ago, he showed symptoms of lameness, and since that time his thigh has evidently been checked in its growth, and is still much less in volume than the other; but he manages to use it pretty well.

Causes and Symptoms.—Paralysis in infants and children may arise either from organic disease of the nervous system; from pressure upon some part of the nervous centres or upon individual nerves; or, lastly, it may be a reflex irritation from some distant part. Let us examine the principal varieties shortly.

1. No doubt that paralysis in children, as in adults, may result from a *partial effusion of blood* pressing upon certain parts of the nervous centres, less in amount than in cases of apoplexy, but sufficient to occasion loss of motive power and sensibility in one-half of the body. Morgagni, for example, mentions a case of spinal apoplexy which was attended with pain and paralysis,† and other cases might be adduced. They are, however, rare in children.

2. When speaking of *tumors of the brain and spinal marrow*, I mentioned that paralysis generally occurs at some period of the disease; at its commencement in a few cases, but generally at a more advanced stage. It may be partial, the effect of local pressure, or affecting generally the motion and sensibility of one side. It is remarkable that although the child may recover to a certain extent from the other accidents of this disease, the paralysis is in almost every case permanent and without mitigation.‡ In Dr. Geoghegan's case there was complete paraplegia; but in Dr. Green's case, certain muscles of the eyeballs alone were affected.

3. *Encephalitis* is not unfrequently accompanied with partial or general hemiplegia, and this paralysis may be combined with involuntary movements of these limbs, or with rigidity. When the inflammation

* Med. Press, vol. vi. p. 202.

† Epistola 10, sect. 13.

‡ See Dr. J. McCormac's paper, May 27, 1843.

ends in softening, we also find hemiplegia among its effects, alone or with convulsive movements of the other half of the body. In these cases, however, the concomitant symptoms are pretty plain, and we shall generally be able to trace the palsy to its true proximate cause.

4. In *abscess of the brain* we almost always find paralysis, as in the cases I have related in a former chapter from Drs. Bateman and Abercrombie. Such cases, however, are both rare and obscure.

5. *Chronic softening of the spinal marrow* is characterized by partial or general hemiplegia. There is great general weakness of the lower limbs, which the patient can scarcely move. Sometimes one limb, or a portion of it only, is paralyzed. In this case, the extremity, or the diseased portion of the spinal medulla, when it is only partially affected, is in a state of atrophy, the muscles being much softer and smaller than those of the opposite extremity. In some cases, when the muscles have continued long in a state of paralysis, the antagonist muscles, acting with uncontrolled force, produce a permanent contraction. On examining the spinal marrow after death, we find it in different states of softening, from that almost resembling a fluid to that which permits the finger to be pressed upon it, and only presents a kind of indentation.

6. *Acute tubercular meningitis*, which often commences by a convulsion, not unfrequently exhibits paralysis towards its termination. The arm or leg, or both of them, lose power and sensibility, and occasionally we see convulsive movements of the opposite extremity. From this disease, and especially from the stage at which paralysis takes place, patients rarely recover, and therefore the paralysis possesses less practical interest for us. In some cases of meningitis, when recovery does take place, we find remaining a kind of partial paralysis; for example, one leg will be more feeble than the other; the child rather drags it, and complains perhaps of its being weak. I have repeatedly observed that children recovering from this disease are less able to walk, less sure footed, and more apt to trip and stumble over slight obstacles than previous to their illness, indications probably of both loss of power and sensibility. Squinting, also, which so often remains after this disease, is clearly a partial paralysis of the muscles of the eyeball. I have also known paralysis of the portio dura remain after an attack of meningitis, presenting all its peculiarities, the face natural in repose, but distorted when speaking or excited, mastication natural, &c. This case has now remained in the same condition for several years.

7. I have already mentioned the paralysis of *chronic hydrocephalus*. In slighter cases we find a diminution of power, but rarely of sensibility of the lower limbs; the child may be able to move them, but can with difficulty, if at all, stand or walk. In other cases the paralysis is observed at an early period, or even from the beginning, and as Dr. Bright remarks, the patients lie in bed with their legs bent under them, or, as in Drs. Ryan and Battersby's cases, the child may be nearly deprived of the functions of vision, hearing, taste, smell, and touch, and

entirely of voluntary motion. In some cases, one leg only is affected ; in others, the lower half of the body, and occasionally, but rarely, the extremities. The same thing is observed in *spina bifida*, which is an analogous disease ; the limbs may be of the natural size, but they are deficient in power. Generally speaking, the sensibility is preserved, and occasionally increased, but I have seen cases in which it was decidedly diminished.

8. After *convulsions* we not unfrequently find a partial weakening of the motor power of certain muscles of the limbs or eyeball ; but if the child recover promptly from the principal disease, this symptom gradually disappears.

9. When treating of *chorea*, I observed that in some cases it terminates in palsy, either in consequence of inflammation or from pressure upon some portion of the brain, spinal cord or nerves, which is not uncommon in that disease. Dr. H. Kennedy has noticed some symptoms of chorea, in two of the cases of paralysis which he has reported.*

So far the paralysis may be distinctly traced to some pathological condition of the brain and its membranes, or of the spinal marrow, of which it appears to be the direct result. In most of these cases the intellect of the child is weakened or totally obscured, and the expression of the face corresponds very accurately ; we see either compression, stupidity, or a fatuous semi-idiotic expression.

10. But by far the most numerous class of cases of paralysis in children are of quite another kind ; originating in causes which act through the excito-motory system of nerves, they present admirable examples of reflex irritation. They generally occur in children between the ages of one and six years, though sometimes earlier. Of Dr. West's eighteen cases, thirteen occurred between eight months and three years of age. From the age alone at which the attack occurs, we might at once conclude that *dentition* must be one main cause, and we have evidence to prove that it is so in the fact that in many cases the most careful inquiry shows us no other exciting cause, that the gums are much swollen and irritated, and that scarifying the gums is often followed by a case of the palsy. The attack may arise during either the first or second dentition, but is much more frequent with the second, or perhaps it may be, as Dr. Heiss has suggested, that the origin is overlooked in young infants from their not using their lower limbs.†

One great peculiarity of these attacks is their suddenness. The child may go to bed perfectly well, and during sleep perhaps become uneasy, restless, grinding its teeth, or groaning and screaming out suddenly. Towards morning, it may be rather feverish, and its head hotter than usual. The next day, we find it unable to raise its arm or leg, or perhaps an arm and leg, or more rarely both arms or an arm and both

* Dublin Journal, vol. ix., p. 91, N. S.

† London Journal of Medicine, Jan. 1850.

legs. The affected arm hangs down helplessly, and, from the gravitation of the blood, the hand and fingers become bluish and swollen, but the temperature of the limb is not diminished. The sensibility is generally more obtuse than usual, and sometimes entirely lost. No pain is felt, but occasionally a sensation of dragging about the shoulder-joint. The leg when affected is equally powerless and insensible, and now and then the palsy seems to extend itself from the upper to the lower extremity. Some variation as to the mode of invasion is observed; the preliminary symptoms may be more prolonged, and occasionally the attack is ushered in by a convulsion. The duration of this form of paralysis is very uncertain. Some cases recover after a few days or a week or two, others continue for months or years; some appear easily cured, others resist all treatment, and in the course of time exhibit symptoms of more serious disease of the spinal cord or brain, as dyspnoea, twitching of the muscles, squinting, perhaps convulsions, or the child falls into a comatose state and dies.

But there is another class of cases, where the disease is not cured, or only partially, but the patient does not die. The limb remains partially or wholly paralyzed, its growth is retarded, and its muscles become atrophied,* while the rest of the body is fully developed. In cases of the upper extremity, the shoulder-joint may be injured. Dr. West saw two cases of dislocation, evidently from the relaxation of the ligaments and the constant weight of the paralyzed arm. Dr. Underwood mentions that he has known the sound side to become paralyzed, the side previously affected recovering its power. As a general rule, the intellect is not enfeebled unless organic disease of the brain should be superinduced; but in some few cases the expression of the face would rather denote a feeble state of the mind.

It is not easy to pronounce upon the exact pathological cause of all these attacks. In the majority of cases, no lesion of the nervous system is discoverable, the attack being a reflex irritation simply. And even when we find some disease of the brain or spinal marrow, it is not always easy to say whether that may be the primary lesion or one that has supervened. Dr. Heiss is disposed to attribute the paralysis to pressure upon the roots of the brachial nerves from excessive congestion; and he has given a case in which this state of the nerves was found in a child who suffered from paralysis and was killed by an accident.† Dr. West states that of his eighteen cases there were but two in which the paralysis appeared to be connected with permanent disease of the brain; and in eight out of eighteen cases no indications of cerebral disturbance occurred before the paralysis, or came on afterwards. Dr. Coley, whilst regarding the disease as a reflex irritation,

* Simpson, Edin. Monthly Journal, Jan. 1851.

† London Journal of Med., Jan. 1850.

observes that he has always found "organic mischief either near the pons Varolii or in the intestinal or laryngeal mucous membrane as the primary cause of the morbid action of the motor nerves."* In two cases mentioned by Rilliet and Barthez, where death was occasioned by an attack of pneumonia, there was no alteration whatever in the brain or spinal marrow.†

Another more limited and local form of paralysis to which I have already alluded, also occurs during dentition. I mean the *facial paralysis*, or paralysis of the portio dura, and which has also been termed Bell's paralysis in consequence of that celebrated physiologist being one of the first, if not the very first, to give the true explanation of it. It may arise during dentition, with or without any other symptom of nervous disturbance, and its peculiarities are so marked that we can have no difficulty in recognizing it at once. During repose, the countenance has its natural calm and equal aspect, both sides being alike and natural; but if any emotion be excited, or the child attempt to speak, the face becomes instantly distorted; the muscles of the affected side are passive, whilst those of the unaffected side draw the mouth, cheek, and sometimes the eyelid outwards. The child can masticate its food as well as other children, but if it should get into the pouch of the cheek, he will generally be obliged to remove it with his finger, because the buccinator muscle is paralyzed, although the temporal and masseter muscles are not. The tongue is not paralyzed, although if the child be desired to put out his tongue, it is protruded crookedly, yet this is on account of the distortion of the mouth. If the angle of the mouth on the paralyzed side be drawn a little outwards by the finger, then the tongue will project straight. The eyelids appear weakened and unable to close promptly and completely, so that in some cases they seem permanently half open. Dr. Watson has drawn the following graphic picture of a patient affected with this disease. "The appearance presented by patients affected by facial palsy is peculiar and very striking. From one-half of the countenance all expression is gone, the features are blank, still, and unmeaning. The other half retains its natural cast, except that in some cases, the angle of the mouth on that side seems drawn a little awry. This is apt to be mistaken for proof of a spasmodic condition of that part; but it is owing simply, as I stated before, to the want of the usual balance or counterpoise from the corresponding muscular fibres of the palsied side. The patient cannot laugh, or weep, or frown, or express any feeling or emotion with one side of his face, while the features of the other may be in full play. One-half of the aspect is that of a sleeping or of a dead person; or stares at you

* British Record of Obstetric Med. June 1, 1848, p. 189.

† Mal. des Enfants, vol. ii. p. 336.

solemnly; the other half is alive and merry. The incongruity would be ludicrously droll, were it not also so pitiable and distressing.”*

This species of paralysis often proves but temporary, the child gradually recovering the use of the affected muscles, but in other cases the paralysis remains permanently, and it is important to bear in mind that it may result from more serious organic mischief. Dr. Graves mentions that he has seen it the result of an apoplectic seizure, and he relates a case in which it was caused by an abscess of the internal ear, with destruction of the tympanum, ossicula, the portio dura, and a part of the petrous portion of the temporal bone.† It may occur alone or in combination with palsy of the limbs. During dentition, also, we find not unfrequently a partial paralysis of the muscles of the eyeball, giving rise to squinting, and in some cases a peculiar drooping of the eyelid, so that the child cannot expose the entire eye, as in ptosis. As to the curability of paralysis connected with dentition, Dr. West informs us that in six only of his eighteen cases was a cure effected; in two of them the portio dura alone was affected; in two others the paralysis of both leg and arm was incomplete and associated with a state of general debility, and in two the loss of power in one leg had come on after the child had been sitting for some hours on a stone door-step. The facial paralysis, when it exists alone, is by far the most easily cured, and it is a disease involving no danger.

11. *Cold* may directly cause paralysis. I have just mentioned that in two of Dr. West's cases it resulted from sitting on a cold stone step, and such cases are by no means uncommon. Paralysis of one arm has come on from lying too long in the grass, and of the portio dura from driving in an open vehicle in the teeth of a cold wind.

12. From the delicacy of the mucous membranes and the susceptibility of the nervous system in young children, we cannot be surprised that paralysis, as well as convulsions, may be caused by a disordered state of the alimentary canal, proceeding from *indigestible food, worms, constipation, &c.* Drs. Underwood,‡ H. Kennedy§ Doherty,|| Graves and others attribute it to this cause, and Dr. Henry Kennedy especially where it complicates remittent fever.

13. *Remittent fever* is occasionally followed by paralysis, most frequently of one of the extremities, of which Dr. Doherty has given a case. Whether it is a pure reflex irritation, or proceeds from some organic mischief, it is very difficult to decide. Dr. H. Kennedy has given three cases, and remarks, that he found them very uncertain

* Practice of Physics, vol. i. p. 548.

† Clinical Medicine, vol. i. p. 569.

‡ Diseases of Children, p. 269.

§ Dublin Journal, vol. ix. p. 88, N. S.

|| Dublin Journal, vol. xxv. p. 78.

as to recovery, some requiring months and others remaining incurable. Sir Walter Scott is an illustrious example of the power of the disease.

14. In like manner, paralysis may follow *scarlatina*; when the patient becomes convalescent, he is found to have lost the use of an arm or a leg. Dr. Kennedy has published a case of this kind, in which there existed a *bruit de soufflet* and slight symptoms of chorea. He has also kindly furnished me with another which occurred in the practice of Dr. Tabuteau of Portarlinton. The child on recovering from scarlatina was exposed to cold, and was attacked by anasarca, for which diuretics and calomel were exhibited. Very unexpectedly salivation occurred, and it was whilst thus relieved from the anasarca, but under the ptyalism, that paralysis of the right side occurred. Dr. Simpson also mentions similar cases.*

15. But other and some apparently unlikely causes may bring on an attack. Sir Charles Bell knew facial paralysis to accompany mumps. Dr. Watson mentions a case in which it arose from a scrofulous tumor behind the ear, which was followed by caries of the bone.† My friend Dr. Stokes informs me that he has seen it connected with a carious tooth, and with a mild attack of tonsillitis; and Dr. Graves from an abscess of the internal ear.

Pathology.—I have incidentally stated nearly all that is to be said upon the pathology of this affection. Certain cases, although by no means frequent, evidently result from disease of the brain and spinal marrow, and the appearances after death will exhibit either hemorrhage, inflammation and its consequences, or tumors, as I have described in their respective chapters. Dr. McCormac attributes it in some cases to spinal concussion or temporary injury of the sciatic nerves; but he does not give any evidence in support of this opinion. In other cases, where an opportunity of making an examination has been afforded, no morbid change whatever has been detected, or perhaps, as in Dr. Heiss's case, some congestion about the roots of the nerves. But our information about the disease is very scanty, as it very rarely proves fatal.

Diagnosis.—As a general rule, there will be little difficulty in forming a correct diagnosis if we make a careful examination. But a superficial inquiry may mislead, and we may attribute the loss of power to the injury of a joint, to a blow, or to pressure, instead of regarding it as a serious disease. But the absence of pain on moving the limb, or examining it, the loss of voluntary power, and the diminished sensibility generally, are sufficiently characteristic.

Another very important question is how to distinguish those cases where the palsy results from organic disease of the nervous system

* Edin. Monthly Journal, Jan. 1851.

† Pract. of Physic, vol. i. p. 555.

from those which are from reflex irritation merely? As a general rule, those cases where an evident exciting cause exists, such as dentition, cold, &c., may be set down as reflex irritation, and this will include a large class; but of the doubtful cases which remain, what are we to say? I should place great value as a guide upon the presence or absence of other symptoms, such as startings, wakefulness, partial convulsions, stupor, heat of head, quick pulse, &c., provided that no other irritation existed which might give rise to them. Facial paralysis is almost always a reflex irritation, but I have mentioned an exception which occurred in my own practice.

Upon the whole, I am inclined to agree with Dr. West, who observes that "in many cases the history of the patient will of itself be sufficient to guard you from error; for if paralysis occur suddenly, affecting both limbs on one side, and be neither preceded nor attended by any cerebral symptom, it is almost certain that it does not depend on serious organic disease of the brain. Our decision will be more difficult if the loss of power have been gradual, especially if only one limb be affected; but if the brain be diseased, you will rarely find a mere weakening of the motor power; for connected with it there will usually be occasional involuntary tremor or twitchings of the limbs, or contraction of the fingers or toes. When the paralysis succeeds to convulsions, the case will be still more obscure. In most cases of simple paralysis, however, the palsy comes on after a single fit; while if it depend on some local mischief in the brain, it is generally preceded by several convulsive seizures, during each of which the limb that afterwards becomes palsied is in a state of perpetual movement, or is sometimes the only part where convulsive movements occur."*

Prognosis.—When the attack originates in organic disease of the brain, the prognosis will depend upon the nature of that disease, and upon the general condition of the patient, the paralysis being rather an aggravation of the prognosis. Upon these subjects I have entered fully in the respective chapters.

The paralysis, which is the result of reflex irritation, is rarely fatal, but it may impair the usefulness of the limb for a long time, and entail its comparative inferiority to its fellow for life.

Facial paralysis involves no danger of itself, though it often proves tedious and sometimes incurable.

Dr. West thus sums up the results in his eighteen cases: "in only six of the eighteen did a cure of the palsy take place;" "in four of these cases the treatment was commenced within two or three days after the occurrence of the paralysis, and continued uninterruptedly until the patient's recovery. In one the treatment was begun after the lapse of three weeks; and in another, though begun immediately, it was discontinued for some weeks. In four instances partial improvement took

* Diseases of Infancy and Childhood, p. 140.

place, and there seems reason for anticipating that in one, this improvement will go on to complete recovery. In two the improvement was but slight; in both these cases, however, there was more serious cerebral disease than in any others. The treatment of another was continued out for a week, and though the child gradually recovered power over the arm, yet the leg remained quite useless. In the other three cases, treatment was begun within a few days, and was continued without interruption. In eight cases, in which no treatment was adopted, or not till after the lapse of a period of six months, no improvement took place in the patient's condition."

Treatment.—I shall not now allude to the treatment of those cases which depend upon organic disease of the brain, but refer my readers to the different chapters upon these diseases.

The facial paralysis which results from the use of instruments, or from pressure, requires but little treatment; it subsides spontaneously in many cases; and in others its disappearance may be assisted by fomentations to the part upon which pressure has been made.

In facial paralysis at a later period, after removing every possible cause, scarifying the gums thoroughly, clearing out the bowels, &c., it is advisable in many cases to apply a leech or two to the neighbourhood of the portio dura, near where it emerges from the skull.

Small blisters are also of use, and I think benefit will be derived from painting the part with tincture of iodine, or rubbing in the ointment of the hydriodate of potash.

Dr. Watson advises that mercury should be given so as just to touch the gums, and for a valid reason: "I always take the latter precaution, lest any effusion of lymph should cause abiding pressure on the nerve." He, however, is rather speaking of adults, and we must not forget that this effect is not so easily produced in children, and we may, I think, rest satisfied with giving a certain amount of mercury, especially if mercurial diarrhœa be produced, even though the gums be unaffected.

The constitution must also be carefully attended to, the bowels regulated, a purgative given occasionally and tonics if necessary. I agree with Dr. West that preparations of iron answer better than other tonics.

When the paralysis affects the limbs, the treatment should be directed to the spine, or near to the place whence the nerves affected issue from the spinal canal. Frictions to the limbs, stimulating applications, &c., which are so commonly employed, are of little use, as they do not go near to the root of the evil; they may quicken the circulation and preserve the heat of the limb, and when the disease is subsiding, may perhaps assist in restoring muscular tone, but no more. Cupping or leeches near the spine, especially if we have reason to believe that there is any congestion;* or where the disease is more chronic, blisters or irritating liniments seem to afford the best chance of relief, but they not unfre-

* Heiss, Lond. Journ. of Medicine, Jan. 1850.

quently fail. Purgatives, not severe ones, and tonics seem to be of more use than anything else. Dr. H. Kennedy speaks favorably of turpentine in doses of a few drops three or four times a day.

Electricity has been tried, but the results have not been equal. Dr. West has found it rather uncertain. Dr. Simpson has known it to fail. Dr. Stokes is strongly impressed with the value of electro-galvanism, and he has found electro-puncturation very successful, but the latter could hardly be used with young children.

In chronic cases, strychnine may be cautiously tried in very minute doses, say from $\frac{1}{40}$ to $\frac{1}{30}$ part of a grain three times a day to a child of three years old, very gradually increasing the dose, but it will require great watchfulness, and an immediate suspension of the medicine if twitching and starting of the muscles be produced. In one case in which Dr. West gave it and at the same time applied a blister, the child seemed much benefited. Dr. Coley quotes two cases in which it was remarkably useful; he recommends the thirtieth part of a grain every eight hours to an infant six or eight months old, and about the twentieth part of a grain to a child two or three years of age; the dose to be gradually increased if convulsive twitchings are not observed after a few days. He recommends a purgative in most cases before commencing the strychnine.

The list of remedies we see is not extensive, nor is their successful action at all certain, but the chances of success are greater when we see the child shortly after the attack.

SECTION II.

DISEASES OF THE RESPIRATORY SYSTEM.

CHAPTER I.

I. INTRA-UTERINE DISEASE.—II. CORYZA.—III. EPISTAXIS.

CONSIDERING that the respiratory apparatus is not used during foetal life, we might naturally expect that it would escape disease; but it is not so. Billard and Cruveilhier observe that in the bronchial tubes we find concretions, polypous masses, and evidences of inflammation; and the latter mentions a case of death immediately after birth in which the bronchi were filled with a thick mucus, apparently the result of chronic catarrh.

Examples of lobular pneumonia are recorded by Cruveilhier; of sanguineous effusion, by Mende, Wrisberg, Joerg; of abscess in the lung, by Koelpin, Mende, and Cruveilhier; of pleurisy, by Veron, Billard, Orfila, and Cruveilhier; of tubercles, by Husson, Chaussier, Cruveilhier, Lobstein and Billard; of scirrhus by Wrisberg; of œdema of the lungs, by Zierhold; and of hydro-pneumonia.*

II. CORYZA.

Nasal catarrh, or, as it is commonly called, “snuffles,” is a very common affection among infants, and very troublesome so long as the infant is at the breast, because the nose is obstructed, and of course, when sucking, the child is not able to breathe through the mouth.

The attack commences by frequent sneezing, with a snuffling sound in breathing through the nose. We are not, however, to suppose that because a very young infant sneezes often it has necessarily taken cold; the impression of light upon the branches of the fifth pair of nerves distributed to the eye, naturally gives rise to sneezing. At first there

* Graetzer, *Die Krankheiten des Fötus*, pp. 163, 169.

is but little discharge from the nostrils, in a short time a secretion of thin mucus takes place, sometimes acrid and irritating; and ultimately of an abundant, thick, muco-puriform fluid. The mucous membrane is unusually vascular and peculiarly irritable and tender, and, after the first stage the sense of smell is lost for a time. The voice, too, is changed to that tone which is popularly expressed by "speaking through the nose." The eyes are in general suffused and watery, sensitive to light, and there is more thirst than usual. Some degree of feverishness is present, the infant is uncomfortable, heavy, and cross, the skin is hotter than usual, and perhaps, but not necessarily, the pulse may be quicker. If the child be old enough, it will complain of heat and soreness of the nose, of some headache in the region of the forehead, and probably uneasiness in the back and limbs, if it be very feverish.

The attack is at its height about the third or fourth day, after which the feverishness disappears, the discharge diminishes, becoming more viscid and yellow, and the difficulty of breathing through the nose ceases. It is very liable, however, to be reproduced by any exposure to cold.

This is the simple and ordinary form of catarrh of the nasal mucous membrane. Drs. Denman and Underwood, however, describe a much more serious variety, which presented itself to their notice for the first time in the summer of the year 1790. It was characterized by a thick, puriform discharge, great, but not constant difficulty of breathing through the nose, at times requiring an attendant to watch the child and to keep its mouth open. A curious purple streak was observed at the verge of the eyelids, which Denman considered pathognomonic, and in most cases a fulness about the throat and neck externally. After the symptoms had continued for some days, the infant became feeble and languid, and upon looking into the throat "the tonsils were found tumefied and of a dark red color, with ash-colored specks upon them, and in some there were extensive ulcerations." The patients "gradually declined in strength, and had a peculiar catch in respiration, as if the velum pendulum palati were elongated. They were unable to suck, though not universally; swallowed with difficulty whatever was given in a spoon; and died in convulsions, or with all the marks of great debility, though not on any particular day of the disease."*

Dr. Denman met with eight cases in eight months, six of whom died. One of them was examined, but no internal organic disease was discovered; and the affection seems to have been an intense inflammation of the entire Schneiderian membrane, with great constitutional debility, and accompanied with disorder of the stomach and bowels, as the stools were thick and pasty, and of a green or blue color. Billard also speaks

* Underwood on Diseases of Children, p. 175.

of a severe form of coryza, accompanied with exudation of lymph, and proving fatal.

I shall notice the syphilitic coryza by and bye; it seldom constitutes the sole symptom, and its true character will be determined generally by the concomitant symptoms.

Causes.—In very young infants it is owing to cold taken in washing, or by undue exposure; the great transition from the warm temperature of uterine life to the severe and changeable atmosphere of extra-uterine existence rendering the infant peculiarly susceptible. It also accompanies certain other diseases, as the exanthemata, and in these countries it prevails epidemically during winter and spring, but affects chiefly infants of more advanced age.

Treatment.—When it exists simply, and is not a symptom of a more general affection of the mucous membranes, but little treatment will be necessary. A dose of purgative medicine, with warm baths at bedtime for a few nights, will relieve the feverish symptoms and headache; and a gentle diaphoretic mixture may be given at intervals through the day.

It is very necessary to do something for the relief of the local complaint, on account of the distress of the infant, and I have found the best thing to be fomentations, by means of a hollow sponge dipped in hot water, and squeezed nearly dry, and then laid on the nose and forehead. The vapor of the water is thus applied both internally and externally, and is very soothing. After this we may adopt the popular remedy of greasing the nose externally, which I know by experience to be very useful, although I am quite unable to explain why. Dr. Charles D. Meigs recommends the application of a flannel cap to the infant's head, and to be worn until the affection yields. In children subject to this annoying disease, Dr. Keating has succeeded in obviating a constant recurrence of attacks by adopting Dr. Meig's mode of treatment.

These measures will apply equally to infants and children: but with the former, if the nose be quite obstructed, it will be better to substitute food for nursing, two or three times in the day; and with the latter, if there be much fever, low diet for a few days will be advisable. When the coryza forms but a portion of a more general attack, the proper remedies for the more serious disease will be beneficial, and, in addition, we need only use the fomentations.

In the more serious variety described by Dr. Denman, he found great benefit from repeated purgation by castor oil, and some cordial, as Dalby's carminative, with the exhibition of the decoction of oak bark, if the discharge continue long. Blisters are inadmissible, for in some cases in which they had been applied, he found the surface ulcerated and sphacelated.

III. EPISTAXIS.

Bleeding from the nose is by no means uncommon with children of all ages, but it is generally very moderate, and, when *primary*, never to such an extent as to endanger life. M. Valleix who has analyzed a great number of reported cases, has not found a single example of primary nasal hemorrhage to this extent, and the researches of MM Rilliet and Barthez confirm his conclusion.*

Secondary epistaxis is not unfrequent in children, and is more serious in its effects. It occurs in purpura hemorrhagica, in the course of eruptive fevers, intermittent typhoid fevers, in whooping-cough, &c. &c.

M. Latour relates an example occurring during the access of quartan ague, and which compromised the life of the child. Rilliet and Barthez mention a case of very considerable hemorrhage which occurred in an infant, attacked with anasarca consequent upon nephritis; and many other cases are upon record.

We have all, probably, witnessed cases of epistaxis occurring during whooping-cough; and during an attack of purpura, the hemorrhage is occasionally sufficient to destroy life.

In general there can be no difficulty in the *diagnosis* of the disease. The escape of the blood externally marks its source; but it sometimes happens that it may proceed from some vessel situated high up the nostril, and after it has ceased to flow externally it may gradually dribble into the back part of the nasal fossa and pharynx, and then, being swallowed and rejected by vomiting, it may be supposed to have its origin in the stomach. The only way of deciding this question is by carefully examining the pharynx, to ascertain if any blood be still escaping, and if so, we can no longer doubt the source of the blood vomited.

Treatment.—When the amount of this discharge is neither too great nor too often repeated, the effort may be salutary rather than injurious, and in such cases we shall not need to interfere.

Should direct treatment be necessary, the best local applications are cold lotions to the forehead and nose, counter-stimulants to the extremities, astringent injections (such as decoction of matricaria or oak bark, &c.), and, as a last resource, the plug.

In many cases of secondary epistaxis, however, there is some morbid alteration of the blood, and the disease which has given rise to this will claim our predominant attention; that being relieved, the epistaxis, like the other symptoms, will disappear. It may, however, for present relief, be proper to have recourse to some of the local applications just named.

* Mal. des Enfants, vol. ii. p. 28.

CHAPTER II.

SPASM OF THE GLOTTIS. THYMIC ASTHMA.
LARYNGISMUS STRIDULUS.

MUCH confusion has arisen concerning this disease, from the use of names, which, to say the least, are inaccurate, and some of which convey altogether false ideas of its nature. Thus it has been called "Millar's asthma," "Kopp's asthma," "thymic asthma," "suffocative catarrh," "false croup," "spasmodic croup," "cerebral croup," whereas it has no affinity at all either to asthma, catarrh, or croup.

The complaint which is characterized by crowing inspirations, occurring at intervals, and repeated irregularly but frequently, appears, at first sight, to be a simple local affection, but upon close investigation will be found to have a deeper origin and a more important character. It is not unfrequent in Great Britain and Germany, but very rare in France, as Barrier, Rilliet and Barthez are mainly indebted for their descriptions to British or German physicians. Drs. Stewart and Condie speak of it as common in America.

It occurs in infants of from a few months or even days to three or four years old. Dr. Copland limits it to between three and four years of age. Dr. James Reid to the period of dentition. However, Dr. H. Ley saw one case at four or five years old, and another between six and seven, and Mr. Porter one at nearly six years of age. Dr. James Reid saw a case of this disease in an infant two days old, and heard of another in an infant a few hours after birth; Sir H. Marsh mentions one three days, and Dr. Underwood one fourteen days after birth. M. Blache found it most frequent from four months to a year, and Guersent from one year to six; but in these countries it is uncommon at the latter age. Most of the German writers state that it is most common between the age of three weeks and eighteen months, but especially between the fourth and tenth month.

The first record we have of the disease, I believe, was in 1761, by Dr. Simpson, who termed it "the spasmodic asthma of infants." A few years afterwards Dr. John Millar described it (in 1769), and from him it was called Millar's asthma. Dr. Rush, of Philadelphia, followed him in 1770 (in the Philadelphia Gazette), and both he and Dr. Warburton, in 1809, and Dr. Hamilton in 1813, give a fair account of it. But by far the most complete description of it is given by Dr. John Clarke, in 1815, under the title "A peculiar species of convulsion in infant children." "The child," he says, "is suddenly seized with a spasmodic inspiration, consisting of distinct attempts to fill the chest, between each of which a squeaking noise is often made. The eyes

stare, and the child is evidently in great distress; the face and the extremities, if the paroxysm continue long, become purple; the head is thrown backward, and the spine is often bent as in *oposthotonos*; at length a strong expiration takes place, a fit of crying generally succeeds, and the child, evidently much exhausted, generally falls asleep.”*

There appears to be a considerable resemblance between this disease and the very rapid form of hydrocephalus described by Dr. Munro, which I have formerly noticed.

Dr. Gölis also alludes to this affection, and includes it among the predisposing causes of hydrocephalus. He speaks of it as “a peculiar disorder of respiration, in which infants, after a sudden waking out of sleep, or from terror or anger, often, without any cause, are suddenly seized with a deep, shrill respiration, which for many seconds, sometimes even for minutes, threatens suffocation. The whole body becomes stiff; the face, hands, feet, and particularly the fingers and toe nails, black or blue; and the little patients lose their breath and consciousness; at length, however, with a cry of alarm, they again recover both.”

Dr. Underwood evidently embraces spasm of the glottis in that mysterious term, “inward fits,” which, he says, is occasionally accompanied “with a peculiar sound of the voice, somewhat like the croup,” with a quick breathing at intervals.

Dr. Cheyne thus describes the disease in his work on hydrocephalus: “It begins with crowing inspiration, like that which takes place at the commencement of a paroxysm of pertussis. At first there are long intervals between the spasmodic inspirations (several days, perhaps), as they appear to be connected with a disordered stomach and the absence of bile in the bowels—to arise from sudden exertion or fits of passion; and as the child often continues to thrive notwithstanding, the disease is not much attended to.”

Very valuable monographs on this affection have since appeared by Dr. H. Davies, Mr. Pretty (cerebral croup), Dr. Robertson, Dr. Montgomery (thymic asthma), Mr. Hood, Sir Henry Marsh (spasm of the glottis), Dr. James Reid, Dr. Ley (laryngismus stridulus, infantile laryngismus), MM. Blache, Guersent, Kopp, Hirsch, Kyll, Caspar, Fricke, Oppenheim, &c., and it is noticed in almost all the systematic treatises.

Symptoms.—The disease appears, then, to consist essentially in a spasmodic closure of the rima glottidis and larynx, terminating by a forced inspiration, rather than in a spasmodic inspiration, as Dr. Clarke supposed.

In the milder cases there are no premonitory symptoms; the attack

* Commentaries on the Diseases of Children, p. 87.

occurs quite suddenly, perhaps on first awaking out of sleep, sometimes even during sleep; after a full meal, or whilst at play, or in a fit of passion. In other cases the attack has been preceded for some days by slight wheezing respiration, and an occasional cough, then suddenly the spasm occurs. Lastly I have seen spasm of the glottis superadded to general convulsions, commencing subsequently, and continuing after they had subsided.

Whether there be preliminary symptoms or not, the muscles of the glottis and larynx are first affected; the child is suddenly startled by finding that it cannot breathe; it struggles violently, becomes red or even purple in the face, the eyes are injected and suffused, the eyeballs protruding, the hands clenched, the head thrown back, and the whole body agitated with distress and fright, presenting the aspect of one in imminent danger of suffocation. This state lasts generally for a minute or two, and at length, after many fruitless attempts, by a vigorous effort, or owing to relaxation of the spasm, inspiration is effected with a loud crowing sound, resembling the whoop of pertussis. A good fit of crying generally succeeds, and then the child, exhausted by the fright and struggles, falls asleep. In some rare cases the countenance remains pallid, though not less expressive of anguish and fear. M. Kopp has remarked that in many cases the tongue is protruded during the paroxysm, and that even during the intervals there is a similar tendency. M. Hirsch mentions that the urine and fæces are often discharged involuntarily during a paroxysm.

I have said that the hands are clenched during the paroxysm, as a portion of the general muscular effort; but if we observe carefully, we shall find that the remarkable spasm of the thumbs and great toes, described by Dr. Kellie, is present: the thumbs are spasmodically contracted, and thrown across the palm of the hand; the toes are bent towards the sole of the foot, and both wrists and feet are rigidly bent downwards and somewhat inwards. The backs of the hands, wrists, and feet appear swollen. This local spasm may continue in a slighter degree after the spasm of the glottis has subsided: the duration of each attack of difficult inspiration being generally about half a minute or a minute; but Dr. Condie mentions their lasting fifteen or thirty.

Dr. James Reid has described four forms of the disease which differ merely in intensity; from the slight catching of the breath, the decided spasmodic breathlessness with carpo-pedal spasm of the second, up to the general convulsions of the third, and the complete asphyxia of the fourth form.

At the commencement of the disease, especially in the milder cases, the spasms occur at distant intervals, perhaps once in the day, or with some days' intermission, increasing in frequency and in severity, unless checked. In severe cases, the paroxysm may occur many times in the day. I have known it repeated thirty or forty times; and in such

cases, although the spasm is at first confined to the muscles of the glottis and larynx, yet, if the disease be neglected or mismanaged, the spasmodic action is extended to the extremities, and may terminate in a general convulsion, as Sir H. Marsh has observed.*

During the intervals the child appears pretty well, but pale, exhausted, and irritable, if the fits are frequent. There is no fever, the pulse is quiet, the tongue clean, the appetite pretty good, and in many cases the bowels are regular. In others, as Dr. Cheyne remarks, there is evidence of biliary and gastric derangement. The respiration is much as usual between the paroxysms, provided they are not very frequent. In the worst cases I have seen it was very hurried. When the disease is complicated with dentition, intestinal disorder, or general convulsions, of course the constitutional symptoms will be more marked; there will be a quick pulse, loaded tongue, pale flabby skin, hurried respiration, and unhealthy evacuations.

The spasm may return at very uncertain and unequal intervals, as I have said, and without any apparent cause, or the very slightest. Trivial irritation or annoyance, contradiction, sudden noises, are quite sufficient to provoke a return. Sir H. Marsh mentions that the smell of new paint always reproduced it in one of his patients.

Dr. H. Davis states that, in all the cases he had lately examined, the tonsils were enlarged, the fauces puffy and swollen, and the uvula elongated; but as these symptoms have not been observed by other writers it is possible that the cases may have been complicated with this affection. He mentions also that in one case there was obstinate constipation, with dysuria, and that every attempt to evacuate the bladder brought on the spasm†.

To another symptom which has been occasionally observed, considerable importance has been attached, from its correspondence with a pathological condition to which the disease has been attributed. I allude to a swelling of the thyroid and thymus glands. Dr. Montgomery mentions a case in which he observed this enlargement, and by directing his treatment to this point the child was cured.‡ In four cases, Dr. Ley remarked a swelling extending from the jaw to the sternum, and laterally parallel to the clavicles. Just in proportion to the reduction effected in this enlargement, was the diminution of the spasm of the glottis and the other symptoms. This enlargement, which would be a most important symptom if general, has not been very commonly observed. One cannot doubt the accuracy of those who have mentioned it; but, to have the significance they have attributed to it, it should have been far more frequently noticed.

* Dublin Hospital Reports, vol. v. p. 618.

† Underwood on Diseases of Children, p. 187.

‡ Dublin Journal, vol. ix. p. 439.

The *duration* of the disease, as well as its termination, is very uncertain. It may continue a few weeks, and then cease spontaneously, or in consequence of suitable treatment; or it may persist longer, and subside after the cutting of some teeth, or from long continued treatment. A considerable number of cases run either of these courses, and terminate favorably. Others, however, prove more serious and end fatally, either suddenly, during the first attack, or during a fit subsequently; or they die after a long illness, in convulsions, or worn out by continual distress.

It has been suggested that fatal spasm of the glottis may be the cause of the sudden deaths, without any apparent cause, that are met with among children. Such cases are recorded by Maunsell and Evan-son, Montgomery, Jas. Reid, and very many writers. The infant may be perfectly well, or perhaps only slightly indisposed, when in a moment it falls back dead, as happened to the infant of a friend of mine. I confess that I am inclined to believe that many of the deaths attributed to the nurse or mother overlaying the child, are, in truth, cases of sudden death from spasm of the glottis.

Pathology.—As one might expect in a disorder which is but a symptom, the appearances on dissection present great variety, according to the other diseases with which it may happen to be complicated. For instance, in many cases, no appearance of disease whatever, in any organ, could be detected.* In others, the cranium is large and imperfectly ossified, the mass of the brain large and rather soft,† or there have been found tumors in the brain, congestion, and effusion of serum, effusion of blood into the cranium, partial closure of the rima glottidis, open foramen ovale, congestion of the lung, congestion of the glands at the root of the lung, enlargement of the bronchial glands, of the thymus gland, of the mesenteric glands, and disease of the intestines, but no one morbid change is found in the majority of cases. This has given rise to an equal variety of opinions, but the very absence of morbid phenomena is a sufficient answer to some of them; as, for example, it is thus proved not to be of the nature of croup, as supposed by Underwood, Ferrier, Hecker, Albers, &c., or of asthma, as stated by Millar and others, because none of the *post-mortem* appearances of either are ever found.

Dr. John Clarke regards it as a convulsive affection, depending upon diseased action of the brain, and induced by over-feeding, the sudden cure of ophthalmia, suppression of cutaneous eruptions, &c.; and he found congestion of the vessels of the brain, water in the ventricles, and mesenteric disease.‡

* Sir H. Marsh, Dublin Hospital Reports, vol. v. p. 616.

† Dr. Shoenf-Merei, Edin. Journal, Nov. 1850.

‡ Commentaries on Diseases of Children, p. 90.

Dr. Cheyne has no doubt that the brain is really the seat of the disease, although the precise morbid condition has not been ascertained. He had seen twenty cases, of which one-third were fatal, and he has given descriptions of these cases: in the first there were two scrofulous tumors imbedded in the brain; in the second, the convolutions were obliterated, and the substance of the brain unusually firm (hypertrophy and induration); in the third, congestion and serous effusion.

Dr. Merriman could detect no cerebral disease in two children who died during the paroxysm. He found a collection of enlarged glands of the neck pressing upon the *par vagum*.

Gardien regards the disease as a spasm of the diaphragm, and of the muscles of the chest and larynx.

The name "cerebral croup," given to it by Mr. Pretty, sufficiently expresses his view of its nature. Kyll attributes it to inflammation of the cervical portion of the medulla spinalis, or to enlargement of the cervical and thoracic glands compressing the pneumogastric nerve.

As early as 1723 it was attributed to enlargement of the thymus gland by Richa, and in 1726 by Verduis. This view has been revived in later years by Kopp, who published a work on the subject in 1830. He found the trachea and larynx healthy, the tongue large and thick at the root, and the body generally exhibiting marks of suffocation; but the most remarkable *post-mortem* appearance was the state of the thymus gland: "In one case it might have been mistaken for the lung, it was so thick and hypertrophied; it extended from the thyroid gland to the diaphragm, was two inches wide, weighing more than an ounce, and pressing strongly against the trachea; on cutting into it there flowed out of its whole tissue a quantity of milky fluid. In another *post-mortem* the thymus was found occupying the whole of the anterior part of the chest, and forming, with the superior part of the thorax, adhesions that could be removed only by the scalpel; it was united to the thyroid gland by thick cellular tissue. By the thymus covering the whole heart, the sounds of that organ had been intercepted during life. The lobes of the gland were elevated and enlarged; its parenchyma presented no trace either of suppuration or tubercles, or any other degeneration; on pressure being applied, there came away an abundant milky humor, like the spermatic liquor in consistence."* Dr. Hirsch published five cases; three proved fatal, and in two there was a *post-mortem* examination: "the thymus of the first of these occupied all the anterior mediastinum, and was composed of two large lobes besides several smaller ones. An appendix of the gland arose about its middle, and surrounded the common jugular vein; the glandular parenchyma was firm, and weighed nine drachms and a half. The thymus of the second child was not so thick nor of so close a texture; it extended from the thyroid gland beyond the pericardium,

* Dublin Journal, vol. ix. p. 514.

which it covered; it had contracted adhesions with the arteria innominata and right carotid, and its weight was six drachms six grains.”*

It may be as well to mention here that the thymus gland, in its normal state, weighs about half an ounce, or six drachms, and extends from the thyroid gland into the upper part of the thorax, lying over the pericardium, lungs, and roots of the great vessels. Dr. Kornmaul mentions a thymus gland weighing fourteen drachms; Dr. Hirsch one weighing nine and a half drachms; and Dr. Van Velsen one weighing nine drachms. Dr. Montgomery mentions that in two cases the gland was enlarged, one of which, he feels assured, weighed two ounces.†

On the other hand, the researches of Caspari, Pagenstecker, Rosch, Fricke, Oppenheim, &c., led to the conclusion that the disease did not depend upon enlargement of the thymus. The latter physician found the plexus choroides full of blood, effusion into the chest, glottis erect, and the rima open; no swelling in the neck, thymus gland much as usual, perhaps rather heavier, but not corresponding to the description of Kopp and Hirsch, and neither pressure nor displacement of the par vagum nor recurrent. Dr. Roberts mentions five cases of enlarged thymus gland, and the editor of the *New York Medical Journal* two, in which the accompanying symptoms were not those of spasm of the glottis, but of pneumonia.

Sir H. Marsh seems to think that the seat of the irritation may be at the origin of the pneumogastric nerve. In one *post-mortem* examination which he mentions there was found effusion into the ventricles, but no other trace of the disease; in another, contraction of the rima glottidis, engorgement of the right lung and erosion of the mucous membrane of the stomach; but in neither is any enlargement of the thymus mentioned, and the author is far too acute and careful an observer to have overlooked it had it been present.‡

M. Trousseau refers the disease to a spasmodic condition, with a want of harmony in the action of the respiratory muscles; and he states that, during the six years he has been at the head of his hospital, he has never met with a single case of thymus sufficiently enlarged to occasion the slightest inconvenience.

Dr. Hugh Ley attributes the disease to a suspended or impeded state of the functions of that portion of the eighth pair, which is distributed to the larynx, caused by enlarged cervical or thoracic absorbent glands, but not from enlarged thymus.§

I have thus given a cursory glance at the chief of the *post-mortem* observations, upon which the different views of the pathology of the disease have been founded. These views may be divided into, 1,

* Dublin Journal, vol. ix. p. 517.

† Ibid., p. 433.

‡ Dublin Hospital Reports, vol. v. p. 515.

§ On Laryngismus Stridulus, p. 113.

those which adduce the evidence of irritation in the central nervous system; 2, those which attribute the affection to pressure upon some particular nerves; and 3, those which look to the enlargement of the thymus gland as the "*fons et origo mali*." Let us examine the two latter views a little more closely. The advocates of the last-named hypothesis generally consider that the enlargement of the thymus, from engorgement, acts mechanically, by pressing upon the larynx and trachea, and obstructing respiration; that relief is afforded, and a cessation of the paroxysm effected by the diminution of the congestion; and the cure completed by the reduction of the gland to its normal size.

Dr. Montgomery mentions three ways in which enlargement of the gland may occur: 1, either as simple hypertrophy; 2, comparative hypertrophy, when there is a disproportion between the size of the gland and the capacity of the upper part of the chest: or 3, as the result of disease; and he thus explains its *modus operandi* in producing spasm of the glottis: "Supposing any cause to occur capable of producing agitation or strong mental excitement in the child, and that the gland has been previously enlarged and capable of great distension, a number of circumstances will occur which combine in rendering that distension still greater, and increasing the size of the gland in such a manner as to affect materially the condition of the surrounding parts. Any cause producing agitation on the part of the child excites the heart's action, the enlarged gland becomes distended and increased in size, presses on the vena innominata, and prevents the return of blood from the head. The same pressure prevents the venous blood of the thymus itself from getting into the innominata, and thus becomes a fresh source of distension. The combined result of this is great and dangerous pressure exercised on the great vessels, preventing the return of blood from the head, and thereby suddenly producing cerebral congestion; on the trachea, by which respiration is impeded; and on the important nerves in that situation, especially the sympathetic, the par vagum, and its recurrent branches, any interference with which has been found, by the experiments of Dr. Alcock, of this city, most powerfully to influence respiration, &c."*

No doubt these views are stamped with high authority, and with a considerable array of learning and research; but there are two important facts, which meet one at the outset, and which have very great weight, so far as the mechanical production of the disease is concerned:—

1. That in a great majority of cases of spasm of the glottis there is no hypertrophy of the thymus perceptible during life, or discovered after death. It is impossible to suppose that such observers as Clarke, Cheyne, Hall, Ley, Marsh, Schoepf-Merei, &c., could overlook

* Dublin Med. Journal, vol. ix. p. 437.

such enlargement; and yet we have their positive testimony that in many cases no morbid changes whatever could be detected, and in others, the disease existing was not enlargement of the thymus gland; and, 2. That many cases of enlarged thymus are on record in which the symptoms of spasm of the glottis never occurred; nay, that no affection of the glottis or trachea was observed, although at the same time the lungs were seriously affected. Dr. Condie remarks: "There has not been adduced a single well-established fact to show that an hypertrophied condition of the thymus is capable, under any circumstances, of exerting upon the nerves in its vicinity such a degree of pressure or irritation as would produce the phenomena of the disease under consideration."* I may add that the enlargement of the thymus gland, when it does occur, has been regarded as the effect, and not the cause of the spasm of the glottis, by Dr. Marshall Hall, and more recently by M. Suiron.†

As to the mechanical pressure of the enlarged gland upon the trachea, producing the disease, it appears more than doubtful, when we consider the structure of the trachea, and that the peculiarity of the disease is not difficult or impeded respiration, but complete arrest of *inspiration*; expiration, when effected, being quite easy. I doubt whether pressure from an enlarged thymus would affect respiration at all; and, if it did, I believe it would affect inspiration and expiration equally; that the dyspnoea would be less in amount than in the present affection, and not so temporary.

With regard to the agency of pressure upon the nerves in causing this disease, whether exercised by enlarged thymus or absorbent glands of the neck or thorax, according to Dr. Ley, I prefer quoting the observations of my friend, Dr. Marshall Hall. "In the first place," he remarks, "as far as my memory and judgment serve me, the cases adduced to support this view, are not cases in point, but in reality cases of other diseases. Secondly, supposing pressure upon the par vagum to exist, it would induce totally different phenomena from those actually observed in this disease; and it would not explain the *series* of phenomena which actually occurs in it; for, 1. Such pressure would induce simple *paralysis*. This would, in the first place, affect the recurrent nerve and the dilator muscles of the larynx; it would not induce a partial but *constant* closure of that orifice—a permanent state of dyspnoea, such as occurred in the experiments of Legallois, or such as is observed to be excited in horses affected with the '*cornage*,' or *roaring*. Secondly, it would induce paralysis of the inferior portion of the pneumogastric, with congestion in the lung or lungs, and the well known effects upon the stomach of a division of this nerve. 2. The disease in

* Diseases of Children, p. 318.

† Ranking's Abstract, vol. i. p. 246.

question is obviously a *part* of a more general *spasmodic* affection, and frequently—indeed, most frequently—comes on in the midst of the first sleep, in the most *sudden* manner, receding equally *suddenly*, to return, perhaps, as before, after various intervals of days, weeks, or even months—very unlike paralysis from *any* cause. 3. It not unfrequently involves, or accompanies, as I have said, *other* affections, *indisputably spasmodic*, as distortion of the face, strabismus, contraction of the thumbs to the palm of the hands; of the wrists, feet and toes; general convulsion! sudden dissolution! a series of phenomena totally unallied to paralysis. 4. Indeed, the larynx is sometimes *absolutely closed*, an effect which *paralysis* of the recurrent nerve and of its dilator muscles *cannot* effect. 5. Paralysis from pressure of diseased glands would be a far less *curable*, a far less *variable* disease, a far less *suddenly fatal* disease, than the complete convulsion. *Thirdly*. Almost all recent cases are at once relieved by attention to three or four things, viz: 1, the state of the *teeth*; 2, of the *diet*; 3, of the *bowels*; and 4, by change of *air*. They are as obviously produced by the agency of errors in one or more of them. *Fourthly*. In fact, the complete convulsion is a *spasmodic* disease, excited by causes situated in the nervous centres, or eccentrically from them. In a case of spina bifida, a croupy and convulsive inspiration was induced by gentle pressure on the spinal tumor. In cases from teething, the attack has been induced and removed many times by freely *lancing the gums*; and, when it has arisen from crudities, it has been relieved by emetics and purgatives, and by change of air, &c. *Fifthly*. There is a series of facts which prove the connection of this disease with the other forms of convulsions in children, and with epilepsy in the adult subject. *Sixthly*. In protracted cases, congestion and effusion within the head occur as *effects* of this disease. *Lastly*. Innumerable cases of undoubted croup-like convulsions have occurred, in which no enlarged glands could be detected in any part of the course of the pneumogastric nerve.”*

These reasons appear to me as conclusive against the supposition of the disease being caused by the pressure of enlarged thymus or bronchial glands upon the nerves, as the former facts were against the supposed efforts of mechanical pressure upon the trachea by the hypertrophied thymus: and we have now remaining only those cases in which a *post-mortem* examination records no morbid change or some lesion of the brain or its membranes, *i. e.*, as Dr. M. Hall has observed, those cases where death has anticipated organic change, and those where time has allowed the organs, at first functionally, to be afterwards organically disordered. Irritation is excited in the nervous system, already perhaps more irritable than usual,† from some distant point, and is again

* Underwood on Diseases of Children, p. 184.

† Reid on Infantile Laryngismus, p. 71.

projected, as it were, to another. I know of no case of disease so illustrative of Dr. Marshall Hall's physiological discoveries. "It is an excitation," he observes, "of the true spinal or excito-motory system. It *originates* in,

- "1. *a.* The *trifacial*, in teething.
- b.* The *pneumogastric*, in overfed or improperly fed infants.
- c.* The *spinal nerves* in constipation, intestinal disorder, or catharsis. These act through the medium of,
- "2. The *spinal marrow*, and,
- "3. *a.* The *inferior* or *recurrent laryngeal*, the constrictor of the pharynx.
- b.* The *intercostals* and *diaphragmatic*, the motors of respiration."*

Causes.—Among the *predisposing* causes have been mentioned the peculiar condition of the larynx in infants, scrofulous constitution, hereditary peculiarities, and climate. It certainly is often observed in several children of the same family successively,† and is undoubtedly more prevalent in moist and damp situations. In dry pure air in the country it is almost unknown, whilst it is sufficiently frequent in town.

The *exciting* causes may be stated to include any species of irritation capable of exciting the nervous system into irregular but not excessive action. Dentition is, perhaps, the most common of such causes; next, indigestible food, or overfeeding, constipation, or disorder of the bowels, suppressed eruptions. Mr. Coley mentions a curious kind of constipation giving rise to it, in which there was an accumulation of fæces in the colon, with a secretion of viscid mucus, like white paint, in the duodenum, and until this was evacuated no relief was obtained.‡

After what I have just said, I can hardly admit tumors pressing upon nerves as exciting causes, except in a different sense to that proposed by Dr. Ley. It is quite conceivable that irritation in or from a tumor may act in producing the disease in the same way as dentition, though not from pressure.

Diagnosis.—The pathognomonic sign of this disease, as Dr. Cheyne has well observed, is "a crowing inspiration, with purple complexion, *not followed by cough.*" The suddenness of the attack, the temporary character of each paroxysm, its facility of reproduction, the absence of the normal symptoms of inflammation of the larynx or trachea, or of much constitutional suffering, are sufficiently characteristic, and render the differential diagnosis tolerably easy.

1. It has been considered as a variety of croup, and has been mistaken in practice for a variety of that disease, or of laryngitis: but

* Diseases and Derangements of the Nervous System, p. 71.

† Ley on Laryngismus Stridulus, p. 53.

‡ Diseases of Children, p. 290.

in these affections the dyspnœa is permanent, and affects expiration as well as inspiration, though not to the same degree, and, notwithstanding, respiration is steadily performed; but in spasm of the glottis, it is the inspiratory effort which is arrested, and for the time, inspiration is absolutely stopped. The rough, metallic sound of croupy breathing is quite different from the clear, ringing crowing of the present disease; and moreover, it is evident in expiration, and is accompanied and aggravated by a severe cough. In spasm of the glottis there is no cough, and in the intervals between the spasms the respiration is natural. Lastly, in the present complaint, there is generally little or no disturbance of the circulation, and no fever; but, as the disease increases, there is a disposition to general convulsions; whilst in croup we have high fever, quick pulse, thirst, heat of skin, and no convulsions, except at the termination.

2. The milder forms of the disease are distinguished from *convulsions* by the purely local nature of the spasm, and the absence of constitutional irritation; but as the more severe cases may merge into general convulsions, the distinction will cease.

3. From *hooping-cough* it is easily distinguished, although there is a great resemblance between the sound of the hoop and the crowing inspiration, owing to both resulting from the same mechanical condition of the larynx, viz.: more or less perfect closure, terminating in a forcible inspiration. But in spasm of the glottis there is very rarely any accompanying cough, and the spasm occurs quite independently. There is no kink, no expectoration, nor vomiting, nor any catarrhal sounds in the lungs.

Prognosis.—In all cases the prognosis is grave, and in the severe case very serious, because of the implication of the brain, and the tendency to terminate in convulsions or in sudden death. One-third of Dr. Cheyne's cases died; Dr. John Clarke says that the patient rarely recovers; Dr. Gooch states, that it proves fatal to one-third of those attacked. Of Sir H. Marsh's cases, five recovered and two died. In Dr. Hirsch's cases three out of five died. And it appears to be more fatal, with males than females. Gervino and Gardien think it almost always fatal if remedies be not employed in the early stage; and this seems to be the general opinion; but, on the other hand, if the complaint be recognized, and the treatment early and prompt, the symptoms will, in many cases, yield to the remedies employed. The change which indicates a favorable termination is a diminution in the frequency and duration of the paroxysms, and freedom from any complications. The unfavorable symptoms are an increase of the spasms, spasmodic affections of the limbs, or general convulsions.

Treatment.—Fortunately, however different opinions may be as to the nature of the disease, all are unanimous as to its treatment. The first thing to be attended to is to detect and remove all exciting causes, as according to them will be the treatment. If the child be teething,

the augmented arterial action within the gums and alveolar processes must be subdued by deep, diffused, and repeated scarification of the gums, conducted with every precaution to avoid excitement of a mental kind."

If we suspect overfeeding, or that indigestible food has been taken, the stomach must be emptied by an emetic, or by tickling the fauces with a feather; and the effect of accumulation, or disorder of the bowels, may be removed by one or two brisk purgatives of calomel and jalap, or rhubarb, or by large enemata of warm water. If the air of the room in which the child has been confined be close and impure, it must be removed to a larger apartment, or fresh pure air admitted.

During the paroxysm, the child should be placed in an upright position, with the head leaning a little forward, and exposed to a current of pure fresh air, whilst cold water is sprinkled on the face. If this fail, the child may be placed in a warm bath, and cold water sprinkled in its face; in short, whatever is calculated to induce a more forcible effort at inspiration. Dr. Condie mentions that the application of ammonia to the nostrils is useful, or tickling the fauces with a feather, so as to induce vomiting. If these means fail, an attempt must be made at artificial respiration. In extreme cases, it has been a question whether tracheotomy ought not to be performed; and certainly, in prospect of instant death, it may be right to try some extreme measures; but the advantage to be derived from this operation is by no means certain, and as yet we want facts to warrant our recommending it.

Mr. W. J. Cox has used chloroform during a paroxysm with great success. "In a few seconds, the muscles will be relaxed, the spasms will be over, and the little patient will breathe freely." A few drops of the fluid should be sprinkled on a handkerchief, or poured into the hand and held before the mouth.

Generally speaking, the paroxysm terminates too quickly to allow of much interference.

During the intervals, our object should be to diminish the frequency of the spasm, and to improve the general health.

In very few cases is bleeding either necessary or useful; in many, it would do mischief by weakening the vital powers. When the child is robust, florid, and plethoric, a few leeches, may, perhaps, be beneficial; but when there is any threatening of general convulsions, or any other evidence that the brain is more than usually involved, then prompt bloodletting will form a necessary and important part of the treatment.

Purgatives are universally recommended, not powerful doses, but moderate ones, repeated three or four times a week, so as to clear out the bowels and act as a derivative. Dr. M. Hall strongly recommends the *antacid* aperients.

* Lancet, Sept. 1, 1849.

Antispasmodics have been found useful. Millar gave assafoetida in large doses: the proper dose, however, for a child of two years is from one to two grains, and four to six grains for a child from five to ten years. Dr. John Clarke used ether and ammonia; Dr. Underwood assafoetida, oleum succini, tinct. fuliginis of the old pharmacopœia, musk, cicuta, &c. Musk may be given in doses of two to five grains, every six or eight hours, to a child of three years old and upwards. It has been strongly recommended by M. Sabatier.* Sir H. Marsh tried the tincture fuliginis with benefit, and, in one case, an infusion of tobacco leaves (gr. v. to ʒvj) as an enema. Dr. Stewart speaks highly of a poultice sprinkled over with Scotch snuff. Drs. Ley and Davis gave henbane with relief; or, if the child be restless, a little Dover's powder may tranquillize it; and Dr. Charles D. Meigs recommends the application of ice to the epigastrium.

In a case where dysuria was present, Dr. Davis derived great benefit from a combination of hyoscyamus, spirits of nitrous ether, and almond milk. When the fauces are swollen, they may be washed over with a solution of the nitrate of silver, with a camel's-hair pencil, or of a mixture of dilute sulphuric acid and syrup.

It will be advisable in most cases to supply some form of counter-irritation, either some irritating liniment, or a blister, or, what I have found far better, a small seton in the arm. In one case under my care, the moment the seton discharged fairly, the spasms ceased, and whenever it was left out they returned.

With almost all children who have the disease for some time, but especially with those of a delicate constitution, tonics will be found beneficial. Sulphate of quinine, infusion of cascarrilla, or of hops, as advised by Dr. Ley, or some of the preparations of iron, may be given in doses suitable to the age of the child. Dr. Davis recommends the vinum ferri, combined with the carbonate of ammonia and hyoscyamus, if the child be languid and irritable; Mr. Cox the citrate of iron, with small doses of hydrocyanic acid, to allay irritation (a quarter of a minim three times a day to a child three years old).

Dr. Schoepf-Merei states that no remedy is equal to the cod-liver oil, in doses of two to four teaspoonfuls a day to a child of three or four months old, increasing according to the age.

Attention to the diet of the child is of great importance. We may succeed in removing the disease, and improper food will constantly reproduce it. The food should all be of a bland nutritious character, and moderate in quantity. If there be any danger of over-indulgence, or of imprudence, it will be better to adopt Dr. M. Hall's plan, and fix upon one kind of food to the exclusion of all other. Dr. Montgomery very wisely cautions us against laying infants on their back

* Archives Gen. de Medicine, June, 1856.

when feeding, if they are liable to this disease, and against hasty feeding.

In the case of infants at the breast, it will be prudent in many cases to change the nurse.

Lastly, I have already alluded to the necessity of a pure atmosphere within the room in which the child lives. I must add that the temperature ought to be carefully regulated, so that it shall neither be too hot nor too cold; and also that the clothing of the child should be sufficient, according to the season, without being oppressive. But very special benefit, as Sir H. Marsh and Dr. Robertson have shown, is derived from change of air. After we have removed all the causes within our reach, prescribed antispasmodics and tonics, we shall often find more immediate benefit from a removal to the pure mild air of the country than from all our medical treatment in town. This should be done as early in the disease as possible, in order to check its progress.

Should the disease increase in spite of all our efforts, and issue in great convulsions, then the treatment must be adopted which I have recommended for that disease.

CHAPTER III.

PERTUSSIS. HOOPING-COUGH.

I HAVE placed hooping-cough next in order to spasm of the glottis because of the similarity between them, the former constituting a transition from purely spasmodic to inflammatory affections, being a mixture of both.

Dr. Cullen has given a brief but accurate description of this disease: "*Morbus contagiosus, tussis convulsiva, strangulans, cum inspiratione sonora, iterata, sæpe vomitus.*" Dr. Copland's definition is an expansion of this, with more details. He says that it is a "convulsive and suffocative cough, accompanied with a reiterated hoop, or consisting of many successive short expirations, followed by one deep and loud inspiration, and these alternating for several times; occurring in paroxysms, ending with the expectoration of tough phlegm, and frequently with vomiting; infectious, and often epidemic, appearing but once during life."

It has obtained various popular and learned names: chin-cough, kink-cough, and hooping-cough, in England; kinkhoast, in Scotland; coqueluche, in France; and, in Germany, keichusten, stickhusten

eselsrusten, &c. By Willis, it was called *tussis convulsiva*; by Hoffman, *tussis ferina*; and by Sydenham, *pertussis*.

It is very doubtful whether it was known to the ancients. No accurate description is to be found in the Greek or Arabian writers; and the disease is so peculiar that they could hardly have omitted to notice it, had it been familiar to them. It has, therefore, been supposed by Rosen that it came from the East Indies and Africa into Europe.

The earliest record of it we find is by Mezeray, as it occurred in France in 1414; but Dr. Copland considers that there is nothing characteristic about his description, or the subsequent ones of De Thou and Pasquier, but the name "*coqueluche*."

The first accurate account is by Willis,* who was followed by Millar,† Sydenham,‡ Alberti,§ Brendel,|| Butler,¶ Dantz,** Paldam,†* Perrada,†* Watt,§* Marcus,||* &c.; and more recently by Guibert,¶* Desreulles,*† Bland de Beaucare,†† Blache,†† Roe,§† C. Johnson,||† Dugès,¶† Copland,*† &c.; besides excellent notices in the systematic works of Dewees, Eberle, Stewart, Condie, Maunsell and Evanson, Coley, Barrier, Rilliet and Barthez, Bouchut, &c.

Whooping-cough has this peculiarity in common with some eruptive diseases, that it occurs once, and in general but once in a lifetime; and consequently almost always in infancy or childhood, *i. e.* the first time the child is exposed to the peculiar exciting cause, whether that be epidemic miasma, or contagion. Thus we find the most common age is between two and ten years.

* Opera Omnia, Amst. 1682, vol. ii. p. 169. De Morbus Convulsiva Puerorum, &c.

† Obs. on Asthma and Whooping-cough, 1769.

‡ Opera Universa, 1726, p. 311.

§ De Tussi Infant. Epidemica, 1728.

|| Prog. de Tussi Convuls., 1747.

¶ A Treatise on Kink-cough, 1773.

** Versuch einer Allgem. Gesch. des Keichhustens, 1791.

†* Der Stickhusten, 1805.

‡* Memoria, &c. Verona, 1815.

§* Treatise on the History and Treatment of Chin-cough, 1813.

||* Die Keichhusten, 1816.

¶* Recherches sur la Croup, et la Coqueluche, 1824.

*† Traite de la Coqueluche, 1824.

†† Revue Méd., 1831.

‡† Archives Gén., vol. iii. 1833.

§† Treatise on the Nature and Treatment of Whooping-cough, 1838.

||† Cyclopædia of Practical Medicine, vol. ii. p. 428.

¶† Dict. de Med. et de Chir. Pratiques, vol. v. p. 487.

*† Dict. of Medicine, part v. p. 236.

Dr. Watt has given the following table of the ages at which death from whooping-cough occurred in Glasgow during thirty years:—

Under 6 months,	in 135 cases.
Above 6 „ and under 1 year, „	357 „
„ 1 year „ 2 years, „	596 „
„ 2 years „ 3 „ „	333 „
„ 3 „ „ 4 „ „	186 „
„ 4 „ „ 5 „ „	109 „
„ 5 „ „ 6 „ „	37 „
„ 6 „ „ 7 „ „	34 „
„ 7 „ „ 8 „ „	12 „
„ 8 „ „ 9 „ „	10 „
„ 9 „ „ 10 „ „	5 „
„ 10 years,	3 „
1817	

The author states, that this may be considered about half of the deaths in Glasgow from this cause.

Out of 130 cases collected by M. Blache, 106 were from one year old to seven, and twenty-four from seven to fourteen years. Of twenty-nine cases observed by Rilliet and Barthez, three were from one to two years old; five, three years; seven, four years; six, five years; two six years; three, seven years; one, eight years; one, nine years; and one twelve years old.* Dr. Hood mentions having seen a child of a fortnight old,† and Dr. C. Johnson one of three weeks old, attacked by the disease.

On the other hand, it has undoubtedly occurred more than once in the same individual, some say even three times; and cases are on record of persons who had escaped until a very advanced period of life. Eberle mentions two cases occurring after fifty years; and Heberden one in a woman of seventy, and another in a man of eighty.

Boys and girls are of course equally exposed to the attack, and yet, according to the researches of Blache and Constant, a greater number of boys arrive at maturity without having had the disease. Blache proved the proportion of such cases to be seven boys to six girls, and Constant three boys to two girls.‡

Symptoms.—The disease has been divided generally into two or three stages. Desruelles and Lombard have a period of invasion, a period of increase, and a period of decline; Blache and Williams divide it into the inflammatory, congestive, and nervous stage; others into the

* Mal. des Enfants, vol. ii. p. 230.

† On the Fatal Diseases of Children, p. 103.

‡ Barrier, Mal. de l'Enfance, vol. i. p. 370.

catarrhal and spasmodic stages, which is at any rate the simplest and most natural division. The period of decline is simply the termination of the second or spasmodic stage.

The *first stage* commences with the usual symptoms of catarrh. The child appears to have caught cold; it is languid, restless, feverish, and irritable without cause. There is loss of appetite, sneezing, coughing, and an extra secretion of mucus from the membrane lining the nose and bronchial tubes after the first day or two. This is by far the most general mode of invasion, a well-marked but not very severe catarrh; but occasionally we find the patient suffering much more, the fever intense, great thirst, the pulse quick, the oppression and general distress considerable, the cough very frequent and painful, dry at first, but with profuse expectoration afterwards. The bowels, according to Dr. Watt, are generally constipated, and require large doses of medicine for their relief; but this, I think, is not generally the case.

In some few cases there is no evidence of the existence of this first stage; the child is at once seized with the characteristic cough, without any irritation of the mucous membrane. M. Blache mentions that the child of his colleague, Dr. Tavernier, æt. two years, was brought home from the country in perfect health, and without the slightest cold. The day after she was playing with two children who had whooping-cough. In the evening of the second day she had an attack of shrill, spasmodic cough, which proved to be whooping-cough, and continued for two months without any complication.* On the other hand, Dr. Watt observes that the disease, throughout its course, may present this character only.† “I have had instances of a disease,” says Dr. Cullen, “which, though evidently arising from the chin-cough contagion, never put on any other form than that of a common catarrh.”‡ And Dr. Burns observes that, “in young children, even death may take place, although the disease never fully forms;” and his observation is confirmed by M. Dugès. I think, however, that in such cases there must ever remain a doubt as to the true nature of the disease.

These catarrhal symptoms continue for twelve or fourteen days, but gradually subside, the fever and coryza diminish, the pulse becomes quiet, and the appetite returns. The cough, indeed, persists, or even appears aggravated, but it exhibits a change of character. Instead of being a simple cough, with few succussions, we find it prolonged by a succession of expiratory efforts, and at its termination we occasionally hear a forcible inspiration, accompanied by a loud ringing sound.

The prolonged paroxysm of coughing, or *kink*, and the *hoop*, mark the commencement of the *second stage* as the subsidence

* Diet. Gen. des Sciences Med., art. Coqueluche, p. 24.

† On the Chin-cough, p. 37.

‡ First Lines of the Practice of Physic, sect. 1406.

of the catarrh does the termination of the first. The cough is very peculiar; when fully established we find "a number of expirations made with such violence, and repeated in such quick succession, that the patient seems to be almost in danger of suffocation. The face and neck are swollen and livid, the eyes protruded and full of tears; at length one or two inspirations are made with similar violence, and by them the peculiar *hooping* sound is produced; a little rest probably follows, and is succeeded by another fit of coughing, and another hoop; until, after a succession of these actions, the paroxysm is terminated by vomiting, or a discharge of mucus from the lungs, or perhaps by both."* The child is perfectly conscious of the approach of the cough; he feels a sensation of rattling in the chest, and tickling in the larynx, which he endeavours to suppress, and the struggle continues until his resistance is overpowered by the irritation.

The paroxysms or a rapid succession of them, may last from one to fifteen minutes, and in proportion to the violence and length will be the breathlessness and fright of the child, and its efforts to inspire. If lying down, it will suddenly jump up, and seize hold of whatever is nearest, so as to make a fulcrum, as it were for the whole muscular force of the body, which is employed in overcoming the spasm. The paroxysm most generally terminates in vomiting, but if it be very violent, some small vessels may be ruptured, and blood escape from the nose or mouth, or it may be effused beneath the conjunctiva, or be mixed with the expectoration. After the fit of coughing is over, the child appears exhausted, and requires a short rest to recover itself; but then, and during the interval until the next cough, it appears tolerably easy and cheerful, occupied with its usual plays, and not averse to food. If the attack be severe, it will be pale, thin, and languid.

The length of the intervals, and the frequency of the paroxysms vary a great deal. At first, and for some time, they are very frequent when the disease is severe. I have known them occur every half-hour during the day and night; but in other cases they return every five or ten minutes during the day; and less frequently at night, though the paroxysms are rather more severe. The principal cause of their return is the accumulation of mucus if the secretion be profuse. Frequent efforts will be made to get rid of it, and if it be easily expelled, in sufficient quantity, the fit will be light, and the interval easy. If it be scanty and tenacious, the paroxysms will be violent, the efforts great, and the cough renewed almost immediately, or it will occur in double paroxysms. A full meal, a fit of anger, crying, fright, or laughter, will generally bring on the cough; nay, even the force of sympathy will have a similar effect, for it is mentioned that, in the

* Dr. C. Johnson, Cyclop. of Pract Med., vol. ii. p. 428.

case of two children who had hooping-cough, when one had a fit of coughing, the other immediately began also. In some rare cases, towards the decline of the disease, the paroxysms have assumed a periodic character, returning at a given hour. A case of this kind is mentioned by Dr. Good;* it occurred daily at a certain hour, continued obstinately for several months, and returned at the same season for two years.

The expectoration which, during the first stage, was a frothy mucus, assumes, in the second stage, a very tenacious character; it may be clear and transparent, or yellow, and even puriform, but still thick, tenacious, and ropy, so that it may be drawn out of the infant's mouth with the fingers.

If we make a stethoscopic examination of the chest during the first stage, we shall find the mucous or sibilant ronchi, characteristic of the catarrh; and the respiratory murmur somewhat weaker than usual. The chest is clear and sonorous on percussion. During the second stage, when the hooping-cough is fully developed, Laennec observes that, "during an interval, we find but the ordinary symptoms of catarrh, *i. e.* the respiratory murmur more feeble than usual, or altogether absent in some parts, otherwise resonant; puerile in others, with mucous or sibilant râles. During the paroxysms we perceive only the vibration of the trunk, from the shock of the cough, and we only hear a slight rhoncus or the respiratory murmur in the short intervals between the succussions. The hooping inspiration, so characteristic, seems limited to the larynx and trachea. Neither pulmonary nor bronchial respiration is heard, even in those parts where puerile respiration had been audible a few minutes before."† Similar testimony is borne by Dr. Williams; he says: "On applying the ear to the chest during a fit of hooping-cough, one is surprised, with such violent external motions, to hear so little sound of respiration within the chest; and, during the sonorous back-draught, there is scarcely any sound of air entering the lungs. This is to be ascribed to the continued contraction of the glottis and large bronchial tubes, preventing the air from entering the pulmonary texture with sufficient force to produce the ordinary respiratory murmur."‡ All writers agree pretty much with this description when the disease is uncomplicated; and, so far as the positive part is concerned, I have no doubt it is true, but I think more can be heard during the intervals in well-marked cases than is here mentioned. I have examined a great many children at intervals, from one paroxysm to another, and I have in a great many cases found that, after the chest had been

* Study of Medicine, vol. ii. p. 393.

† De l'Auscultation Mediate, vol. i. p. 188, 2nd edition.

‡ Pathology and Diagnosis of Diseases of the Chest, p. 89.

cleared by the last cough and vomiting, the respiratory murmur on inspiration was louder, and more rough than usual, nay, in some cases, that it had a rather loud, brazen sound, something resembling a loud sonorous râle, as if the air was passing through tubes much narrower than usual. It is perceptible, also, in expiration, though more feeble. This sound may continue until the mucus begins again to accumulate, and then it will be exchanged for the large, mucous, bubbling sound, which increases until the next cough, and is almost universal. In milder cases the rough dry sound is more feeble, though generally audible, and I think this loud, rough murmur of inspiration and expiration quite peculiar to pertussis. The chest is clear on percussion throughout this stage in simple cases.

The explanation given of the cough and the hoop by Dr. Roe is, I think, satisfactory: "Any one who will make the experiment will perceive that by the exercise of the voluntary muscles of respiration, he cannot either continue coughing loudly for so long a time, or empty the lungs so completely of air, as a person does in paroxysms of whooping-cough; it must, therefore, be inferred that the involuntary muscles, namely, those pointed out by Reisseissen, as connecting the extremities of the cartilaginous rings of the trachea and bronchiæ, powerfully assist in accomplishing both these objects. They seem, by acting spasmodically, to expel the air from the lungs, and to excite, by sympathy, the voluntary muscles of inspiration; the combined action of both sets of muscles appears to produce this peculiar cough." I think it extremely probable that the spasmodic action involves the smaller bronchial tubes as well as the larger. "The hoop takes place in the larynx and trachea, and appears to be caused by a rush of air through a contracted passage, for no sudden or violent inspiration could produce this sound in the natural healthy state of the air tubes. The lungs are so completely emptied of air, by long-continued expirations, that a most distressing sense of suffocation is produced, to relieve which, a full inspiration is instinctively made, and at the same moment the rima glottidis is contracted, and the air passing quickly through a very narrow opening causes the hoop."*

The action of the heart is excessively quick and strong, and it is a little time before it subsides to the natural standard during an interval.

The second or spasmodic stage persists a considerable time, generally six weeks or two months, but often three, four, or six months: if we make a third stage, one month may be allotted to the spasmodic stage, and the remainder to the stage of decline.

The effects upon the child will be pretty much in proportion to the violence and duration of the disease, and the susceptibility and delicacy

* On Whooping-cough, p. 89.

of the constitution. They are seldom of serious importance, however, if the pertussis be uncomplicated. The appetite is generally diminished, and the digestion disturbed by the frequent vomiting: nutrition is not very effective, and the child loses flesh. The sleep is interrupted, the circulation deranged by the excitement of the cough, the surface is moist, with profuse sweating sometimes; the flesh is generally flabby, and the skin is of a darker hue, especially underneath the eyes; the spirits are unequal, often depressed.

As the disease declines, the paroxysms become less frequent, though, perhaps, equal in violence. They now occur but four or five times during the day, and rarely at night; ultimately, towards evening only, and under special excitement, and then are reproduced at distant intervals only, and with much less violence, until they cease altogether. Meanwhile, if not too much exhausted, the constitution begins to recover its healthy condition; tranquil sleep restores the nervous system; the absence of vomiting allows the food to be digested, and the child recovers flesh and spirits; the circulation returns to its normal condition, and the surface assumes its natural aspect.

Thus we find that in simple pertussis the first stage is characterised by the symptoms of common catarrh, which, however, are occasionally absent, and the second stage by the peculiar prolongation of the cough in inspiration, *i. e.* the kink and the forcible inspiration or hoop. In some very rare cases the kink is but little remarked, but it is always present in a greater or less degree, and is, so far, more characteristic than the hoop, which is not unfrequently absent. The presence of either will prove the nature of the disease, but the absence of both would, of course, deprive us of the power of diagnosis.

The entire duration of the disease is from two to four months. According to popular belief it is six weeks coming to its height, and six weeks, going off; but it may be almost indefinitely prolonged, as, for some time afterwards, the hoop returns when the child catches cold. Marley mentions a case in which the symptoms did not disappear for two years:* and Dewees and others mention its continuance for twelve months. According to Barrier,† the child may die in simple whooping-cough, from the intensity of the kinks; it may, in short, be suffocated. The disease also may prove fatal from exhaustion, and the child die, utterly worn out, according to Hamilton,‡ Barrier, and others; or, what is more common, it may lay the foundation of other diseases, such as dilatation of the Bronchial tubes, phthisis, epilepsy, struma, ophthalmia, &c. "In scrofulous habits," says Dr. Watt, "the disease is not so apt to prove suddenly fatal; but if it be severe and protracted it generally ends in some affection of the glandular system,

* Diseases of Children, p. 159.

‡ Mal. de l'Enfance, vol. i. p. 378.

† Diseases of Infants, p. 169.

laying the foundation for tabes mesenterica, rickets, or pulmonary consumption.”*

Complications.—So far I have spoken only of simple hooping-cough, but we find that a very large proportion of the cases during some part, at least, of their course, are complicated with other secondary affections, and a careful inquiry will establish the fact, that it is to these complications that almost all the mortality is owing. Simple hooping-cough is rarely fatal, and yet the mortality in hooping-cough is very great, arising from the liability of other organs to take on morbid action, and from the circumstance that in three out of the four most frequent complications the hooping-cough causes and reproduces them. I shall notice complications with,

1. Bronchitis or pneumonia.
2. Infantile remittent.
3. Congestion of the brain, convulsions, or hydrocephalus.
4. Sanguineous apoplexy.

Other minor or more rare complications are mentioned occasionally by authors, but I shall content myself by noticing briefly the foregoing.

I. *Pertussis complicated with Bronchitis and Pneumonia.*—This will be found in these countries the most frequent, and one of the most fatal of all the secondary diseases. Of Barrier’s cases, seven out of ten died of lobular pneumonia. Of twenty-seven fatal cases under Dr. West’s care, thirteen died from bronchitis or pneumonia.† Dr. Copland attributes the frequency of this complication during the winter to the variable climate of these countries, and the prevalence of easterly winds.

The attack, as we have seen, commences with some degree of bronchitis; this may be very intense, and it may continue on during the second stage instead of subsiding, or it may occur at any subsequent period, either from the stress thrown upon the lungs, from a strong predisposition, or from cold. The same may be said of pneumonia, except that the latter is more common during the second stage than the first, and in children of a full habit of body.

The age has little to do with these complications. They are met with in children of all ages, and very often creep on very insidiously, so as to deceive the physician as well as the nurse, unless he adopt the proper precaution of auscultating the chest very frequently. I would strongly recommend that this should be done at each visit, as a matter of duty, in all cases of hooping-cough, and minutely and thoroughly whenever we suspect the existence of more than the simple affection. The presence of bronchitis or pneumonia during the first stage may be suspected by the greater amount of constitutional disturbance, the quick pulse, high

* On the Chin-cough, p. 75.

† Medical Gazette, Feb. 25, 1848, p. 311.

fever, loss of appetite, dyspnœa, and incessant cough, with a diminution or cessation of the hoop, and we may certainly ascertain the fact by percussion and auscultation.

During the second stage, after the subsidence of the catarrhal fever, the occurrence of bronchitis or pneumonia will generally be marked by the return of the fever, loss of appetite, the increase of the cough, and the addition of difficult or hurried respiration during the intervals, as well as by constitutional disturbance in proportion to the intensity of the disease. We need, however, to be very watchful, for in some cases the inroad of the disease is very gradual, and marked by few symptoms, until the little patient is beyond aid.

It is not necessary that I should here detail minutely the symptoms and course of either complication; they will be found in the proper place; it will be sufficient to notice, that the child will generally be found to be very feverish, and restless; sleeping uneasily, with a quicker pulse, greater thirst, hotter skin than usual, and a red flush on one or both cheeks. The respiration is considerably affected, quick, hurried, and difficult, the chest heaves, the *alæ nasi* expand, and the muscles of the chest and abdomen are in vigorous action, *even during intervals* of coughing. We may sometimes count thirty, fifty, eighty, or a hundred respirations per minute, and the pulse will be, in proportion frequent, and in general hard. The cough is generally aggravated in frequency, and more distressing, but in severe cases it may altogether lose the spasmodic character, and exhibit that of the cough in bronchitis or pneumonia. If the cough had already declined, it may return, as during the early part of this stage. The expectoration is more difficult, the sputa being less profuse and tenacious, and of a puriform appearance. As the disease advances, the cough may diminish, but the wheezing and dyspnœa increase, the fever continues, the respiration is more frequent, hurried, and labored, the pulse very rapid, small, and feeble, the cheeks and lips purple, the surface cold and clammy, and death soon closes the scene.

If the child be attacked by *bronchitis*, we shall find the chest generally clear on percussion; in some parts there may be a degree of dullness, but it is never either extensive or absolute. By the stethoscope, sonorous, sibilous, and mucous râles will be heard over a portion or the whole of one or both lungs. I think I have more frequently seen both lungs affected than one alone, and it will be observed that these rhonchi are as audible immediately after a fit of coughing, and during the interval, as just before the cough comes on, therein differing widely from simple whooping-cough. The respiratory murmur will be feebler than usual, and more or less masked by bronchitic râles.

In cases of secondary *pneumonia*, the chest is dull on percussion over the diseased portion of the lung, but resonant in other parts. The stethoscope will detect a crepitating râle in the early period of inflammation, with puerile respiration in the surrounding lung, or if the

entire lung be involved, the respiration will be puerile in the other. At a more advanced stage, we may find a portion of the lung solidified ; absolutely dull, without respiration or rhonchus, but in which bronchophony will be audible. If the child live until suppuration be established, which is very seldom the case, there may be heard a large mucous bubble, or a large crepitus, with, perhaps, cavernous respiration, and the dulness on percussion may diminish. So, in the progress of recovery, the lung which was solidified, and impermeable to air, will now yield at first a mucous or crepitating râle, and then gradually more and more respiratory murmur, with increasing resonance on percussion ; and along with this local amelioration, we shall have a diminution of the dyspnœa and rapid breathing, a return of the natural cough, a quieter pulse, calmer sleep, and restoration of appetite.

II. *Pertussis complicated with Infantile Remittent.*—I have already mentioned that the condition of the stomach and bowels is variable in whooping-cough ; they may be pretty regular, or they may be much disordered ; and in our anxiety about the principal affection, they are liable to be neglected. During the first stage, the effect upon the concurrent disease, and upon the infant may be comparatively slight, but in the second stage, when the constitution is somewhat shaken, it may prove more serious, and require great attention and prompt treatment to prevent it running on into infantile remittent and its consequences. This disordered condition of the bowels will be marked by a foul, loaded tongue, loss of appetite, tympanitic abdomen, and unhealthy discharges. These may continue for some time, and then, if not relieved, symptoms of infantile remittent will arise. “After the symptoms just enumerated have continued for a longer or shorter time, the fever makes its appearance, sometimes commencing with a rigor ; more frequently, however, it comes on, so gradually that we do not know precisely when to date its commencement. The paroxysms of coughing become more frequent, and the breathing is quickened and oppressed ; but still it may be, with a little care, distinguished from the attack of bronchial inflammation. The stethoscope affords us useful, though negative evidence. The usual symptoms of bronchial inflammation are absent. The frequency and force of the respiration are found increased, but this increase is not accompanied by any râle indicative of bronchial inflammation ; while the daily remissions, the loaded tongue, the nature of the alvine discharges, the aspect of the child, constantly picking its nose and lips, all serve to determine the true character of the disease.”* There is a marked difference between the inspiration in this and the last complication ; in the former it was quick, hurried, and difficult ; in the present, it is quick, hurried, and somewhat unequal, but not difficult.

* Dr. C. Johnson, *Cyclop. of Pract. Med.*, vol. ii. p. 430.

The fever, also, unlike that which accompanies hydrocephalus, has distinct remissions in the morning, and increases towards evening; whereas, in the majority of cases of meningitis, it is nearly equal, and, certainly without remissions. It must not be forgotten, however, that infantile remittent may terminate in hydrocephalus, if not relieved. This complication is neither so frequent nor so formidable as the last, but quite sufficient to render the disease very intractable, and often fatal.

III. Pertussis complicated with Congestion of the Brain, Convulsions, or Hydrocephalus.—We might anticipate the occurrence of these complications, even before experience had proved the fact. If we watch a child during a paroxysm of hooping-cough, and notice the great congestion of the vessels of the head, face, and neck during the fit, and observe how often this is repeated during the day for weeks together, and remember the delicate condition of the brain in young children, and especially in infants, our wonder will be, not that these cerebral affections occur at all, but that they are not more frequent.

These attacks may occur in children of any age, but are more common in young infants, or about the period of the first dentition, and they are highly dangerous, if not generally fatal. Dr. West mentions that fourteen of his twenty-seven fatal cases died from congestion, convulsions, or hydrocephalus; and all who have had much experience will admit the rarity of cure, and the rapidity with which they run on to a fatal termination.

These complications may accompany the disease at its commencement, or may arise at any period of its course. Dr. West remarks very truly, "The nervous system suffers sometimes so severely from the very first, that death takes place almost before the disease has had time to assume its natural character. At other times, hooping-cough comes on naturally; its two elements, the bronchitic and the nervous, if I may be allowed the expression, increase daily in intensity, till all at once, the symptoms of the former recede, and are almost lost in those of the latter, which, in a day or two, bring on the fatal termination of the case. Or, lastly, no symptoms referable to the nervous system call for our solicitude until after the hooping-cough has continued many weeks; but then the long continuance of the disease seems to excite mischief in the brain, and death overtakes the patient when we had already begun to hope that nothing more than time was needed to perfect his cure." We may fear the occurrence of one of these complications when we find the cough increase in severity, without either of the former complications; the face become livid, and remain so longer than usual; the existence of the carpo-pedal spasm, the previous occurrence of nervous affections, any hereditary taint, or convulsions or hydrocephalus in other members of the family.

Probably the earliest symptoms will be an unusual sleepiness and

heaviness after the fits of coughing, with an uncertain look of the eyes or stare; spasmodic twitchings of the face or extremities; carpopedal spasm; or sometimes an attack resembling spasm of the glottis; and any of these may be followed by an attack of convulsions and coma, or coma without marked convulsions. Or perhaps the first evidence of the brain being seriously affected may be a fit of convulsions, fatal in some cases, but from which the patient generally recovers, to be again attacked when the congestion from coughing reaches a certain point. The convulsion, when repeated, does not return, with every fit of coughing, but generally as the result of a very severe paroxysm. This constitutes our great difficulty in the treatment: we may relieve the head temporarily, but just as we fancy ourselves successful, a cough of unusual violence destroys all the effects of our previous exertions. Meningitis, or hydrocephalus, may set in in the same manner, or it may creep on more insidiously, until at length it be manifested by the usual symptoms, as heretofore described. Dr. West has given a striking example of the insidious manner in which tubercular meningitis may come on during whooping-cough, and prove fatal, without affording us an opportunity of suitable treatment.

These diseases will generally run the course I described when treating of them, modified partly by the presence of the cough, as a permanent exciting cause, partly by the influence they in turn exercise upon the cough, and partly by the state of health of the child. Thus they are even more unmanageable than in their ordinary form, in consequence of the repeated cerebral congestion; they may either partially suspend the cough, *i. e.*, diminish its frequency, but not its violence, or, by adding force to the spasm, death by suffocation may be the result of the sudden closure of the larynx; or, lastly, if the child have been harassed and broken down by whooping-cough for some time previously, the constitution will offer but little resistance to the secondary attack.

With regard to the distinction between convulsion and hydrocephalus, occurring as secondary affection, it does not appear easy, nor do I deem it very important, and therefore I have grouped them together. It is almost certain that if the convulsions continue for any length of time without proving fatal, they will terminate in hydrocephalus. Dr. Johnson observes in his excellent essay, "It is said that in hydrocephalus one side of the body is more affected than the other; but in convulsions, which are independent of organic disease of the brain, that both sides are equally affected. If the convulsions are confined to one side of the body, there is every reason to fear the existence of hydrocephalus; but it certainly does not follow, because the convulsions are general that the brain is unaffected. In the latter case we must wait till the convulsions subside before we can discover their cause, and then we must form our opinion from the general state

of the child, and the history of the case, rather than from any peculiarity in the convulsion itself."

IV. *Pertussis complicated with Apoplexy*.—We have already seen that fatal apoplexy may occur from excessive congestion of the brain: it cannot, therefore, surprise us to find, in a disease involving such frequent congestion of the vessels of the head, that occasionally cases occur in which the vascular fulness produces not merely convulsions, but a true apoplectic attack. The same result may take place from a higher degree of pressure, under which the texture of the vessels gives way, and effusion of blood takes place between the membranes, or into the cerebral substance.

Although this appears a natural result of the pressure exercised upon the brain by the repeated force of the cough, it does not seem to be a frequent complication, unless we suppose that the sudden deaths on record, are really such cases. It is mentioned by Marley and others: and I shall quote a case from Barrier, as illustrating the mode of attack, and in some degree countenancing the suggestion I have just made, that some at least of the sudden deaths may have been owing to sanguineous apoplexy:—"Claude Charmillon, æt. 17, had suffered six weeks from hooping-cough, when admitted into the Hospital des Enfants May 5, 1848. The first stage had lasted about fifteen days, and for a month past the cough had been accompanied with hoop, and followed by vomiting of glairy matters, more frequent during the night than the day, free from complications, and the condition good during the intervals. During the first few days he was under M. Barrier's observations, the cough was forcible and frequent, sometimes followed by epistaxis. Auscultation gave evidence of fluid in the bronchial tubes. May 9. The patient, being feverish, was bled. May 10. Considerable catarrh. May 11. Slight eruption of scarlatina. After this the eruption continued quite as usual, but the bronchitis increased, and the bleeding was repeated with benefit. But the patient became emaciated, and phlebitis set in where the vein had been punctured, and two abscesses formed in the fold of the arm. The hooping-cough had necessarily diminished, when in the night of the 31st May, the patient died suddenly after a severe fit of coughing. On making a *post-mortem* examination, the lungs were healthy, the bronchial mucous membrane inflamed. The bronchial and thymus gland, the heart, and abdominal viscera were healthy; but on opening the cranium, a great effusion of blood was found in the cavity of the arachnoid covering the convexity, and also at the base of the right hemisphere of the brain and cerebellum with some blood infiltrated between the pia mater and arachnoid of the same side."*

* Mal. de l'Enfance, vol. i. p. 381.

The symptoms then, which ought to excite alarm, are a continuance of the congestion about the head and face, unusual drowsiness, &c. ; and we find that the attack may either occur suddenly, proving instantly fatal, or the drowsiness may degenerate into stupor and coma, equally fatal but less rapidly so. Though not a frequent complication, it is in all cases a most serious one.

Pathology.—We have very rarely any opportunity of examining the condition of the organs engaged in *simple* hooping-cough, on account of its rarely proving fatal, unless complicated, and then there is danger of mistaking, as many have done, the effects of the letter for the former. It is only when the child dies from some other disease, or from some distant complication, that we can ascertain the real condition of the lungs. In such cases, there is more frequently no trace at all of disease in the larynx, trachea, or lungs ; in other cases there is slight vascularity of the mucous membrane of the glottis and larynx, and sometimes sub-mucous œdema of these parts. When the cough has been violent, we may occasionally discover some interlobular emphysema, owing to the rupture of some of the air cells, and, though rarely, this emphysema has extended to the surface. Ulceration of the glottis and in the larynx and trachea have been mentioned by Astruc, Mackintosh, and Alcock. The bronchial tubes are found more or less filled by mucus, and occasionally by muco-purulent fluid. My friend Dr. Heiss informs me that in several cases of hooping-cough, which proved fatal from lobular pneumonia, and which he examined with M. Friedleben, they found an enlargement of the bronchial glands, so that pressure on the nervus vagus and the recurrens seemed not unlikely.

In fatal cases from any of the complications, the usual *post-mortem* appearances are discovered. In bronchitis or pneumonia there is vascularity of the lining membrane of the air passages, muco-purulent secretion, congestion, and hepatization of the lung.

Simple convulsions generally leave no trace, or merely an unusual degree of vascularity.

When the child has been attacked by hydrocephalus, the usual evidences have been found : extreme vascularity of the membranes, congestion of the vessels of the cerebrum and cerebellum, effusion of serum, tubercular deposition, &c.

And in cases complicated by apoplexy, extreme congestion and vascularity of the substance of the brain, or sanguineous effusion as in M. Barrier's case.

Thus the rarity of opportunities for examining cases of simple hooping-cough after death, and the fact that, in those which have been examined, some of the appearances I have enumerated have been found, has misled many observers as to the essential nature of the disease, and given rise to very various and contradictory views on the subject.

Linnaeus mentioned that it arose from inhaling, in respiration, the

minute eggs of a peculiar species of insect;* and his view, somewhat modified, was advocated by Riverius, Dessault, Rossentein, &c. Hoffmann attributed it to an acrid serum in the blood; Sydenham to some irritating effluvia cast off from the blood into the lungs, in consequence of suppressed transpiration. Huxham thought it was owing to a morbid condition of the intestinal canal; Butter that it depended upon derangement of the liver; Waldschmidt and Stoll that it was caused by crude and bilious matter in the stomach. Dr. Watt, judging from the results of his *post-mortem* examinations, attributes it in all cases to inflammation of the bronchial tubes, either so mild as to cause no inconvenience, or so severe as to cause death. Mr. Dawson limits the inflammation to the mucous membrane of the glottis and larynx. Dr. E. Watson considers the pharynx and larynx to be involved with peculiar irritability of the glottis.† MM. Marcus,‡ Kroussais, Boisseau, Guersent, Rostau, and Dugès, regard it as a specific inflammation of the bronchi. M. Danz places the seat of the disease in the lungs, and Strong, Cullen, Astruc, Lettsom and Darcy, mention having found evidences of inflammation of the mucous membrane of the larynx and trachea. Dr. Webster considers the whooping-cough as essentially a cerebral disease; he found, on examination, the hemispheres of the brain very vascular, the convolutions almost obliterated, serous effusions, &c.§ M. Lobenstein Löbel met with a case in which a considerable portion of the diaphragm was covered with pustules. Dr. Alcock states that he found the larynx invariably inflamed, and sometimes so as to close the glottis mechanically, that the mucous membranes of the trachea and bronchi were very vascular, and that the cavities of the latter were filled with fluid mixed with air.|| M. Alph. le Roi agrees with Dr. Webster that whooping-cough should be classed among diseases of the membranes of the brain. M. Gilbert considers the disease as essentially nervous or spasmodic, the cough being caused by a spasmodic affection of the glottis and diaphragm.

Inflammation of the pneumogastric nerves has also been regarded as the essential cause of whooping-cough. It has been observed twice by MM. Breschet and Autenrieth, and fifteen times by Killian; but notwithstanding the most careful dissection, MM. Jadelot, Guersent, Baron, and Billiard could discover none. M. Albers, of Bonn, out of forty-seven cases, found that in forty-three the nerve was healthy; in one it was reddish on the left side, and in three on the right side. The late Dr. Sanders, of Edinburgh, considered congestion at the origin of the pneumogastric and other respiratory nerves to be the essential

* Diss. Exanth. viva in Amœnit. Acad. vol. v. p. 82.

† Dub. Med. Press, Feb. 1850.

‡ Traité de la Coqueluche, 1816; trad. par. M. Jacques, p. 67.

§ Lond. Med. and Phys. Journal, vol. xlviii.

|| Lectures on Surgery, p. 135.

pathology of hooping-cough, and Dr. S. Piddock adopts this opinion and bases his treatment of this disease upon it.* Laennec admits that the suspension of inspiration may be owing either to congestion of the mucous membrane or to spasm, and that the larynx and bronchiæ are affected. Dr. Alderson makes the disease to consist in inflammation of the lungs.† Dillon, Hufeland, Löbel, Breschet, Albers, and Eberle,‡ regard it as a nervous disease, perhaps of the brain, or perhaps of the pneumogastric nerve. Desruelles says that “hooping-cough is nothing more than bronchitis complicated with irritation of the brain; and that the inflammation of the bronchiæ is always primitive, the irritation of the brain consecutive. So long as the bronchitis is simple, the cough is without any peculiarity; but when the diaphragm, muscles of expiration, and of the glottis, larynx, and posterior membrane of the bronchiæ and the air cells of the lungs, come into action, and are simultaneously affected with spasm, under the influence of cerebral irritation, the cough changes its character, and becomes convulsive; and every time that an afflux of blood takes place into the brain, the cough returns, and appears in paroxysms.”§

M. Blache is of opinion “that hooping-cough is a nervous affection, having its seat both in the mucous membrane of the bronchiæ, and in the pneumogastric nerves; an affection very frequently complicated with bronchitis and pneumonia, but which may exist without them; and, like all other diseases of the same kind, having no appreciable anatomical character.”|| In this opinion Dr. Roe, MM. Barrier,¶ Rilliet and Barthez,** and many of the more recent writers, coincide.

Dr. Copland considers the “medulla oblongata, or its membranes, to be early implicated in this disease; evidences of inflammatory irritation of these parts having been very generally observed in the *post-mortem* inspections I have made. I conceive that the morbid impressions or irritation occasioned by the exciting cause in the upper part of the respiratory surfaces, particularly the glottis and its vicinity, affect the respiratory nerves, especially the pneumogastric; and that the irritation is extended to the origin of the nerves, when it aggravates and perpetuates the primary affection.”††

Dr. James Duncan has recently proposed to class hooping-cough with exanthemathous diseases, a view which was formerly broached by Volz,

* Lancet, June 16, 1849.

† Med. Chir. Trans., vol. xvi. part 1.

‡ Diseases of Children, p. 479.

§ Traité de la Coqueluche, p. 77.

|| De la Coqueluche. Archiv. Gén. de Méd., 1833, vol. iii., second series.

¶ Mal. de l'Enfance, vol. i. p. 39.

** Mal. des Enfants, vol. ii. p. 228.

†† Dict. of Med., part v. p. 242.

the resemblance having been already noticed by Jos. Frank. The essence of the disease, according to Dr. Duncan, consists in turgescence of the bronchial glands, coinciding with or arising from a peculiar fever, and the results of a specific poison ; and acting upon the pneumogastric nerve, in the way Dr. Ley supposed in the case of spasm of the glottis.*

Dr. Fyfe, in a late paper, looks upon the disease as a neurosis altogether distinct from bronchitis, and he affirms that the two diseases cannot co-exist.†

It would have been very easy to have multiplied conflicting opinions ; for most writers, having the pre-conceived opinions of the school in which they had been educated, were prepared to view the disease in a certain light. Thus the humoral pathologist saw in it some peculiar acrid quality of the fluids, and the morbid anatomist mistook the results of a *post-mortem* examination for the active pathology of the affection, and both were undoubtedly in error.

The different views of the nature of the disease may be thus summed up :—

1. That it consists simply in inflammation of the mucous membrane lining the air-passages, the glottis, larynx, trachea, bronchial tubes, and air-cells.

2. That this inflammation is of a specific character.

3. That it is an affection either of the pneumogastric nerves, spinal nerves, medulla spinalis, the brain, or the nervous system generally ; either of a nervous or inflammatory character, or a reflex irritation.

4. That it is a compound affection : in the beginning an inflammation of the air-tubes, and subsequently a spasmodic or nervous affection.

5. That it is a nervous affection, having its seat in the bronchial mucous membrane, and in the pneumogastric or other nerves.

Now, if we are to decide the question by the result of *post-mortem* investigations, we must necessarily conclude that none of these theories can be the true one, because the facts upon which they are based are by no means sufficiently general ; some indeed are so rare that it is evident they are additions to the primitive disease, and others so very uncommon that one must conclude that they have nothing at all to do with it.

Again, if we analyse minutely the history of the disease, and compare many cases together, we must arrive at the conclusion that they are divisible into two great classes, the simple and the complicated, and that these differ, not merely in degree, but in kind ; that the former present upon the whole, a very uniform appearance, with similar stages, symptoms, and course ; but that the latter possess additional symptoms, of different kinds, by which their history is altogether modified ; they are,

* Dublin Quarterly Journal of Medical Science, &c., Aug. 1847.

† Prov. Med. and Surg. Journ., June 16, 1847.

in short, hooping-cough, *plus* the peculiar complication of each. This is so evident that the best modern authorities have based their description of the disease upon it.

On this ground we must reject those *post-mortem* evidences of extensive bronchitis, pneumonia, arachnitis, congestion of the brain and spinal marrow, redness and swelling of the pneumogastric nerves, &c., as being foreign to cases of simple hooping-cough; and if we then proceed to the consideration of the question of the nature of the disease, we find very little assistance to be obtained from morbid anatomy, for in the majority of cases of death from other affections during hooping-cough, the air-passages exhibited little or no trace of the disease.

If we turn to the history of the disorder, we find that it generally commences by a catarrhal affection of the mucous membrane of the eyes, nose, and air-passages, amounting, in some cases, to actual bronchitis; but it may be doubted how far this must be considered essential to the disease, inasmuch as many cases occur in which it is altogether absent. And as this affection subsides, in its place we have a peculiar spasmodic cough, consisting of a series of forcible succussions during expiration, with an impossibility for a time of making a complete inspiration. This impediment to inspiration evidently arises from spasmodic action of the muscles of the larynx, trachea, and bronchial tubes, extending probably to the smallest, as it comes on quite suddenly and subsides as suddenly. And although the cough is excited by the presence of mucus, and has for its object its removal, yet its character is peculiarly spasmodic and unlike any ordinary cough.

Now, without attributing it to organic disease of the brain or spinal marrow, we cannot but refer the peculiarity of this cough and hoop to a state of the nervous system analogous (shall I say) to that which gives rise to spasm of the glottis: in other words, that hooping-cough is also a case of reflex-irritation of the nervous system, excited, no doubt, by other and different causes, but exhibiting a similar transference of effects.

We are at present, I believe, quite ignorant of the nature of the peculiar exciting cause. We know that it exists, and that when it is applied the primary irritation of the mucous membrane arises, followed by the reflected nervous irritation which gives rise to the peculiar phenomena of the disease.

Causes.—I have already mentioned that this disease is most common in infants and children, though not absolutely confined to them; and although, doubtless, the chief cause of this is, as Dr. Watt observes, “that few individuals can pass many years of their lives without being so much exposed to the contagion as to bring on the disease,” yet there does appear to be something in the constitution of children which renders them peculiarly susceptible to its influence. Dr. Butter observes that “the nervous system bears a much larger proportion to the other solid parts in children than in adults; the solid parts are likewise of a much softer texture and of a much quicker growth; the

human body is then endued with much more irritability than at any other period of its existence," and consequently more easily affected. "One can hardly doubt," says M. Gendrin, "that, owing to the development and extreme activity of the circulation, and the permeability of their tissues, that infants are in the most favorable state for the absorption of miasmata." On these grounds, it has been attempted to explain the fact that more girls have the disease than boys.

Climate has much influence upon the mortality in the disease, though little, if any, upon its presence and extension. It is very prevalent and very fatal in northern regions; less frequent and much less severe in the south, as a general rule, to which, however, there are exceptions, as in the fatal epidemic of 1808, in Madeira. In these countries, it appears more frequent in winter and spring; and, according to Dr. Watt's tables, March was the most fatal month, and July, August, and September the least. The agency of a cold and moist atmosphere in the production of the disease is much insisted upon by Richter, Marcus, Desruelles, &c. It appears also to be in some way connected with other epidemics, often appearing just before, during, or immediately after an epidemic of measles or influenza.

Now and then we meet with single cases of hooping-cough; but such are comparatively rare, for the disease almost invariably spreads through a town or village, either by epidemic influence or by contagion. No one questions the occurrence of the disease as an epidemic; it has repeatedly spread thus over extensive districts, and proved most fatal. De Thou, Sennert, Sauvages, Riverius, &c., notice epidemics as occurring in 1510, 1557, 1580, 1757, 1767, and 1769, and many of them spreading over a great part of Europe. According to M. Desruelles, Pasquier mentions an epidemic of this kind in 1411, in Paris, which attacked more than one hundred thousand people. De Thou and Sennert mention another in the same city in 1510; Riverius one that spread almost over Europe in 1557; Baillou one in 1578. In Sweden, Rosen has noticed their prevalence from 1749 to 1765, during which 43,393 deaths occurred. Geller one in 1757, in the duchy of Magdeburgh; Arand one that occurred in Mayence, in 1769; Aaskou one that happened at Copenhagen, in 1775. Dr. Willey mentions that in 1805 it was introduced into Block Island, and prevailed epidemically.* Dr. Tretis that it was epidemic in Madeira in 1808,† and proved very fatal. In 1817, it is said by Marcus to have been epidemic in Milan and at Bamberg. Since then, partial epidemics, with which we are all familiar, have occurred, limited generally to a city or town, but occasionally spread over a tract of country more or less extensive. No doubt the characters of these epidemics, and especially of

* American Med. Repos., vol. x. p. 95.

† Medical and Physical Journal, vol. xxiii. p. 100.

the complications of whooping-cough, differed very much. Thus sometimes the patients were attacked by epistaxis, sometimes by convulsions; in other cases by eruptive fever, or by some visceral inflammation, as is recorded by Ozanam.

It must always be extremely difficult, if not impossible, absolutely to prove the contagiousness of an epidemic disease, inasmuch as proximity or contact involves also exposure to the same atmospheric influence. Nevertheless, there are diseases which prevail epidemically (smallpox and measles, for instance) which are admitted by all to be contagious, and among them we must class whooping-cough. No doubt its great extension is as an epidemic; but yet we see now and then cases which appear to be fairly communicated from one person to another, as, for example, in the case related by Barrier, of children who caught the disorder at a day-school, and, being confined at home by it, communicated it to their father and mother; and those related by Dugès.* The weight of opinion is certainly in favor of its being propagated by contagion. On this side we have the authority of Cullen, Sims, Hillary, Watt, Hamilton, Underwood, Dewees, Eberle, Stewart, Johnson, Roe, Barrier, Dugès, &c. Laennec, Desruelles, and others, have expressed a doubt of this being the case, and others have altogether denied it; but to my mind the evidence is conclusive.

Diagnosis.—We must always take into consideration the positive and negative evidence in forming our judgment. The most striking characteristics of the disease are the subsidence of the catarrhal and setting in of the spasmodic stage, with the remarkable kink and hoop. It is not very easy to mistake either; but I must recall to my readers what I have mentioned before, that the hoop is not always present, and also that in very young infants and during dentition a common cough is often accompanied by an occasional hoop. The kink, however, is almost never absent (both cannot be absent together, of course, or the case would not be whooping-cough); and the series of forcible and rapid succussions, without intervening inspiration, is observed in no disease that I know of, to the same extent, except asthma, which is not an affection of childhood. No doubt, in some forms of *bronchitis* there is a paroxysmal character of cough, kinks of coughing in fact, though different from those of whooping-cough. Rilliet and Barthez have laid down the difference very distinctly. In pertussis we have the catarrhal stage generally preceding the kink; in bronchitis the paroxysm of coughing is coincident with the commencement of the disease. In pertussis we have the hoop, the glairy tenacious expectoration and almost always vomiting; in bronchitis the kinks are shorter and less intense, no hoop, but little expectoration, and no vomiting. In simple pertussis there is little

* Dict. de Méd. et de Chir. Prat., vol. v. p. 488.

fever, no hurry of respiration during the intervals, and the respiratory murmur pure; in bronchitis the fever is intense, the respiration hurried and increasing in frequency, râles sibilant and mucous, afterwards subcrepitant. In pertussis the kinks continue for a time, then decrease until the cough becomes simple, and the child convalescent; in bronchitis the smallness of the pulse, the extreme dyspnoea, paleness of face persist or increase, and the disease almost always terminates fatally.*

Prognosis.—In simple hooping-cough there is comparatively little danger, the principal risk being from exhaustion, or from the setting in of some of the diseases already mentioned as following upon hooping-cough in delicate, broken down children. Young infants, even, who are carefully nursed, go through the disease very well.

But in epidemics, because of the complications, and in single cases which are complicated, the danger is very great, and the mortality very high. In the epidemic of 1583, 9000 children are said to have died at Rome. In Sweden, from 1749 to 1764, Rösen states that 43,393 deaths occurred from this disease, and of these, 5832 occurred in the year 1775. Dr. Armstrong mentions that from 1769 to 1777, 732 cases occurred at the dispensary for the infant poor, and that twenty-five died.† Dr. Watt mentions that on the whole the deaths from hooping-cough, in Glasgow, amount to five or five and a half per cent. of the entire deaths in the city; and that in 1809 they amounted to 259, or more than eleven and a half per cent.‡ In Prussian Pomerania the deaths were as 1 to $25\frac{1}{2}$ of the entire mortality; in Denmark, as 1 to $21\frac{1}{2}$; in Brandenburg, as 1 to $29\frac{1}{2}$; in Sweden and Finland, 1 to $13\frac{1}{2}$; in Strasburg, 1 to 94; in Boston, 1 to 82; in Charleston, 1 to 46.6; in Baltimore, 1 to 95.38; in New York, 1 to 64.7; and in Philadelphia, 1 to 63.1.§ In the admirable Report upon the Population Census of Ireland, Mr. Wilde states the mortality from hooping-cough to have been 36,298 in ten years, in the proportion of 100 males to 115.43 females. "It has proved most fatal in the rural districts, being there in proportion to all other diseases as 1 in 30.48, and to those of the epidemic class as 1 to 9.09; while in the civic districts it is 1 in 36.76 of the deaths from all other causes, and 1 in 14.04 of those denominated epidemic or contagious. Its general mortality, in comparison with all other affections, for the entire kingdom, is 1 in 35.71, and of the total epidemic diseases, 1 in 10.5. In the metropolis, this affection was to the total epidemics, 1 in 17.47; in the province of Leinster, 1 in 12.24; in Munster, 1 in 11.24; in Ulster, 1 in 9.4; and in Connaught, 1 in 9.1."||

* Mal. des Enfants, vol. ii. p. 223.

† An Account of the Diseases most incident to Children, p. 142.

‡ On the Chin-Cough, p. 24.

§ Condie on Diseases of Children, p. 667.

|| Report upon the Tables of Deaths, p. 15.

With such evidence of the fatal results of the disease, it will become us to inform ourselves most carefully as to the age, constitution, previous health, and the actual state, not merely of the lungs, but of every organ of the body, before giving our prognosis ; and even then it will be wise to be very guarded, to watch well for the first symptoms threatening any of the complications. The symptoms which justify a favorable prognosis are the paroxysms being distant, with intervals of complete relief and quiet respiration, the rest at night not much disturbed, the appetite good, no local complications, and the absence of fever. The unfavorable symptoms are, frequent and violent cough, hurried respiration, dyspnoea, fever, loss of sleep and appetite, and any indication of local complication.

Treatment.—As it is generally admitted that whooping-cough will run its course notwithstanding all our efforts, it is pretty clear that but little treatment, and that palliative, is necessary in the milder cases. During the first stage, a gentle antimonial emetic may be given, followed by an expectorant every four or six hours, with a dose of aperient medicine, and a repetition of the emetic occasionally, a warm bath at bedtime, and confinement to a warm, equable temperature. I would also remark that in different epidemics different remedies seem to succeed. Some formerly successful, seeming to lose their power, and when this is the case it is right to suspend their use and have recourse to others.

Burton, Millar, Lientaud, and others, deprecate blood-letting, and certainly, unless the disease be complicated, or the first stage set in with great violence, it is quite unnecessary ; in the latter case, loss of blood will lower the fever, relieve the catarrhal oppression, and render the second stage milder ; but the amount should be carefully regulated, and be rather under than over the mark. Willis, Sydenham, Lettsom, Dewees, Dugès, &c., recommend the abstraction of blood under these conditions. Dr. Pidduck, in accordance with his views of the pathology of the disease, advises leeches directly over the junction of the occiput and the atlas vertebra, followed by a blister between the shoulders, and he speaks most strongly of their good effects if the disease be uncomplicated.

The use of emetics of tartarized antimony was first recommended by Dr. Armstrong, who had employed them “for eighteen years with very good success,*” and they have since been advised by the highest authorities. They may be given, as I have said, at the commencement, and repeated occasionally.

A mixture with ipecacuanha wine, syrup of squills, a little syrup of white poppies, and almond milk, or mucilage and water, will answer very well as an expectorant ; or we may give Coxé's hive syrup, as

* On Diseases most incident to Children, p. 50.

recommended by Dewees, which is made by boiling half a pound of senega root and dried squills, in eight pounds of water, over a slow fire, until half is consumed, and then adding to the strained liquor four pints of strained honey, and again boiling down to six pounds, and adding a grain of tartar emetic to each ounce. The dose must be regulated according to the age of the child, from six to eight drops or upwards, every hour or two.*

Probably the best aperient medicine is castor oil, or rhubarb magnesia and ginger; and the frequency of its administration must be regulated by the state of the bowels, which should be well evacuated.

The diet should be bland, and, if there be much fever, confined to milk and vegetables; if otherwise, a little chicken broth may be allowed.

During the *second stage*, marked by the peculiar cough and hoop, the tenacious mucus, and the absence of fever, we shall find it beneficial to continue the emetics occasionally, and also the expectorant medicine; but in addition it will be necessary to employ some antispasmodic remedy for the relief of the paroxysm.

Probably the most common is *opium* in some form. A few drops of laudanum may be added to the expectorant mixture, or we may adopt Mr. Pearson's† plan, who, after an emetic, prescribed one drop of laudanum, five drops of ipecacuanha wine, and two grains of carbonate of soda, every four hours. As the cough subsided, he diminished the opiate, and substituted the gum myrrh for the ipecacuanha wine.

Dr. Dewees recommends a combination of paregoric, antimonial wine, liquorice, gum Arabic, and water, as a mixture, and I can add my testimony, if it be necessary, to its value. Lombard recommends the syrup of white poppies, Condie the watery extract of opium, and others Dover's powder. There is no reason, however, for believing that opium will cure the disease, but it renders the paroxysms less severe and composes the patient.

Hemlock is highly recommended by the older writers. Dr. Butter, in 1772, praised it as a specific. Dr. Armstrong tried it in 357 cases, of whom seventeen died, but nine of these, he says, were unfavorable cases.‡ The formula he employed was this:—

R.—Extr. cicutæ, gr. x.
Aq. puræ,
Aq. menth. pip., āā ʒiv.
Sacch. alb. ad grat. sapor. q. s.—M.

A dessertspoonful was given to an infant six months old, every four

* On Diseases of Children, p. 437.

† Med. Chir. Trans., vol. i. p. 25.

‡ On Diseases of Children, p. 142.

hours; three teaspoonfuls to a child of a year; and a tablespoonful to one of two years of age.

Dr. Gumprecht speaks most highly of the extract of the *lactuca virosa* in the second stage. He advises half a grain, with sugar, three times a day, for children of two years of age.*

Acetate of lead has been highly praised by Dr. Reece.† He prescribed the following mixture: Four grains of the acetate of lead, two drachms of syrup of violets, and two ounces of water: of which he gave to a child four years old a teaspoonful every six hours, increasing the dose to two teaspoonfuls the following day.

But perhaps the most influential narcotic and sedative we possess is the *belladonna*; it has been very extensively employed, and the evidence in its favor is very strong. Hufeland, Jackson, Guersent, Blache, Stewart, Condie, &c., speak highly of it. As it is very powerful, and somewhat uncertain, we should begin with small doses, and watch it very closely. From one-quarter of a grain to one grain of the powdered root, and from one-eighth to one-half a grain of the extract, may be given two or three times a day. Dr. Jackson advises that one-sixth of a grain should be given to a child of three months old, every three hours; to a child of two years old, one grain; and to a child of four years, a grain and a half in each dose.‡ Jackson, Guersent, and Blache recommended its continuance until the effect upon the pupil is evident; it may then be discontinued. Kahleiss gave it in combination with Dover's powder, and between each dose a mixture containing prussic acid. M. Trousseau combines it with opium and valerian. M. Guersent recommends equal parts of henbane, belladonna, and oxide of zinc; of the latter he gives one grain every hour to a child of six months old.

M. Caron du Villards derived great benefit from *laurel water*, in doses of six drops every two hours. Dr. Krimer, of Halle, and Dr. Brofferio, recommend the inhalation of its vapor.

Hydrocyanic acid was first used, I believe, in whooping-cough, by Fontaniottes and by Coullon, in 1801, and since by Heineken, Behr, Kahleiss, Muhrbeck, &c. It was introduced into this country as a remedy in this disease, by Dr. Granville, in 1819; and has been tried successfully in America, by Drs. Edwin Atlee, Stewart, Condie, and others. Dr. Roe has found it most valuable in checking and cutting short the spasmodic stage. I have tried both the laurel water and the acid repeatedly, and the latter certainly with great benefit, though it failed in many cases to shorten the disease. "The dose of hydrocyanic acid," says Dr. Roe, "for an infant, is about three-

* Med. Chir. Trans., vol. iv. p. 608.

† Med. Chir. Rev., vol. xv. p. 37.

‡ American Journal of Medical Science, August, 1834.

quarters of a minim, of Scheele's strength, gradually increased to a minim, which may be given every fourth hour; for a child of three years of age, about one minim, gradually increased, if necessary, to a minim and a half every fourth hour; for children of ten or twelve years of age, a minim and a half, increased to two minims every fourth hour. It is safer to give this medicine in small doses, at very short intervals, than to run any risk of producing too great a depression by a large dose. The frequency of its exhibition must depend upon the strength of the patient and the severity of the attack. The dose should be repeated when the effects begin to subside, which in mild cases generally happens in three or four hours; but when much fever is present, its influence is felt but a very short time: under such circumstances, a larger quantity may be given, and at shorter intervals, without any apprehension of danger, *so long as the fever lasts*. In some very severe cases, when the pulse was up to 120, with a good deal of fever, and a hot skin, I have given to a girl of ten years of age a minim and a half of this medicine every quarter of an hour for twelve hours; at the end of twenty-four hours she was free from fever, and her strength was not in the least reduced by the effects of the remedy. As some catarrhal symptoms are generally present, a few drops of ipecacuanha or antimonial wine may be advantageously combined with the hydrocyanic acid: but the latter alone possesses the power of curing this formidable complaint.* I would suggest that this medicine should always be given in draughts, and not in a mixture, because then only can we be quite sure that the child will not get an overdose. I have found almond milk an excellent vehicle.

Other narcotics have been recommended, but I need hardly occupy the reader's time with them; I will only add a general observation or two; and first, that as narcotics have the effect of diminishing secretion, that effect should be corrected by some expectorant, or the original tenacity of the mucus of the second stage will be increased, and its expectoration rendered more difficult; secondly, that (with the exception of the prussic acid) narcotics are of less efficacy in proportion to the amount of fever, and it is when that has subsided that they possess so much power over the spasm; and, lastly, as they also constipate the bowels, more or less, we must counteract this effect by an occasional purgative.

Among the antispasmodic remedies we find also assafoetida, castor, musk, valerian, sal ammoniac, &c., highly recommended, and which may, perhaps, in some cases be useful, but which are evidently inferior to the narcotics.

Variations in the mode of administering narcotics and antispasmodics

* On Hooping-cough, p. 89.

have been adopted. Mr. Warren recommends liquid laudanum to be rubbed on the abdomen and pit of the stomach daily. Morphia, applied to a blistered surface, has been useful, according to Brendt and Meyer, of Minden, who state that five cases were so much relieved by it in eight days as to require no further treatment. Embrocations consisting in part of laudanum, have been very long employed with benefit. Another mode is by inhalation. Marley mentions that he has known "inhaling the steam of a decoction of the fresh leaves of hemlock, alone or with ether, to be of use."* Dr. Stewart mentions that fumigation with the vapor of benzoin was accidentally discovered, a few years since, to allay, with remarkable quickness, the paroxysms of whooping-cough.† Dr. Watt and Mr. Waddington‡ have used the vapor of tar with success; and it is said that relief has been afforded by the fumes of warm spirits of turpentine. M. Paterson made some experiments with the nitrous ether, but I do not know that they were very successful.

Soon after the discovery of the anæsthetic effects of *sulphuric ether*, it struck me that it would be likely to modify or suspend the spasm in whooping-cough; and having a case under my care, I directed that a little (I suppose about half a drachm) should be spilled upon the nurse's hand and held before the child's nose and mouth at the commencement of a fit of coughing. I preferred this simple mode of administration (and do still) because of the impossibility of thereby giving an overdose. The effect surpassed my expectation. Most generally, the paroxysm was shortened more than one-half, often stopped immediately, and the duration of the disease unquestionably considerably diminished. Since then, I have tried the ether in twelve or fourteen cases, and *chloroform* in more. In one or two cases, no benefit accrued; in most others, great mitigation of the spasm; and in several complete arrest of each paroxysm of the cough when the inhalation was commenced in time. Decidedly, also, in two-thirds of the cases, the course of the disease was much shortened, so that I look upon this as a valuable addition to our remedies. In no instance was insensibility or the least inconvenience occasioned. There are two obstacles to its fair administration with very young children; 1, they do not give notice of the approach of the cough, so that by the time the chloroform is ready the paroxysm has commenced, and, as that consists of expirations mainly, the chloroform will have evaporated before its full effect is produced; 2, young children resist any apparent impediment to free respiration, as a hand placed before their mouth. I have, however, had an opportunity of trying it in several cases of young persons above sixteen years of age. In two (girls), in whom the hoop

* Diseases of Children, p. 163.

† Diseases of Children, p. 109.

‡ Lancet, June 21, 1845.

was fully developed, it arrested it at once; and, after using it for two days, the hoop entirely disappeared, a trifling cough only continuing for some time. In a third (girl), it was used from the commencement. It immediately stopped or prevented the hoop, and always relieved the tickling preceding the cough; and, after using it three or four times a day for three weeks, the disease disappeared. She never lost appetite or sleep, vomited only once or twice, and was never distressed by the cough. Her brother, who had the disease most severely, also took chloroform, and it reduced the paroxysms more than one-half in number during the twenty-four hours, without diminishing their intensity; but, as it seemed to make him stupid, it was suspended, and prussic acid given, under which treatment the disease was cured in a month.

In 1797, Mr. W. Simmonds, of Manchester, recorded his experience of the great value of *arsenic* in the form of Fowler's solution—in small doses, even with infants. He says that it seldom failed to put a stop to the disease in about a fortnight, and that with proper precautions no ill effects were produced.

When the disease is pretty well advanced, and especially when the constitution has suffered, if there be neither complication nor fever, great benefit will be derived from tonics; and of these, perhaps, *cinchona* has the most advocates. Dr. Burton, Mr. Sutliff, Dr. Lettsom, and Dr. Armstrong recommend it very highly in combination with tincture of cantharides and paregoric, as in the following formula for a child of three years old:—

R.—Decoct. cort. Peruv. ʒvj,
Elixir. sudorif (paregoric), ʒiij.
Tinct. cantharid. ʒj.—M.
Capiat semi-unciam ter in die.

Dr. Hamilton speaks highly of the Peruvian bark. We have the evidence of Dr. Beatty as to the value of Mr. Sutliff's compound of bark, paregoric, and tincture of flies; and, on his recommendation, Dr. Graves was induced to try it, and found it very successful.*

Dr. Golding Bird speaks most highly of *alum* in the second stage, after all inflammatory symptoms have subsided and the mucus is tenacious and expectorated with difficulty. He gives from two to six grains of alum every four or six hours, to children from one to ten years of age. The following is his formula for a child of two or three years:—

R.—Aluminis, gr. xxv.
Extr. conii, gr. xij.
Syr. rhœados, ʒij.
Aquæ anethi, ʒiij.—M.
Capiat cochl. med. 6ta quâque horâ.

* Graves's Clinical Med., p. 762.

Dr. Davis, in his edition of Underwood, "attaches more value to alum than to any other form of tonic or antispasmodic."

Tannin, in doses of from half a grain to three grains every second, third, or fourth hour, has been recommended by some high German authorities. Dr. Durr speaks highly of tannin and benzoin in the latter stages of whooping-cough. He gives from two to five centigrammes of each with fifty centigrammes of sugar every two hours.*

Dr. E. Watson applied Dr. Horace Green's plan of cauterizing the glottis and larynx with a solution of *nitrate of silver*, and in several cases with apparent success. The strength of the solution was gr. xv. to the ounce and applied by whalebone tipped with sponge, at first to the pharynx only.

Oxide of zinc has been praised by Guersent and Lombard; the lobelia inflata by Eberle; the rhus vernix, garlic, and electricity by others; arsenic by Dr. Ternan and Mr. Simmons; sulphuret of potash by Dr. Bland; the sesquioxide of iron by Drs. Steymann and Lombard, &c.; liquor ammoniæ by Dr. Peyroton, &c. In fact, there is no end to the list of remedies which have been recommended in whooping-cough; and probably my readers may thank me for not extending mine further. I think I have included the most important; and I shall only notice, in conclusion, the use of external counter-irritants and change of atmosphere.

That external rubefacients are of use there is no doubt, especially when combined with a narcotic, as already mentioned; but that they will cure or cut short the disease I do not believe. Roche's embrocation is a popular liniment, or we may order one of compound camphor liniment and laudanum, two ounces of the former to two drachms of the latter. The chest and back should be rubbed alternately morning and evening. Dr. Hamilton seems to approve of garlic to the soles of the feet; and a popular use of it is to steep it in brandy and rub the spine. The celebrated "pommade d'Autenrieth" is simply tartar-emetic ointment, which is most strongly recommended by many writers of high authority.

Vaccination has been recommended as a remedy. I am not aware of its having been tried in this country; but Dr. Heiss informs me that some continental experience is rather favorable to it, and Dr. Jackson says that he has employed vaccination in several cases, and has every reason to be satisfied with the result, having found it to modify both the severity and length of the affection.

Great stress has been laid upon change of air, and no doubt, at a certain period, the removal from a town to the country, if the air be mild and the weather fine and warm, does promote convalescence; but, on the other hand, much mischief may result from indiscreet changes and undue exposure. Dr. Merriman remarks, most judiciously, "I am

* Prov. Med. and Surg. Journal, April 3, 1850.

not acquainted with many, if with any, instances in which the force of the disease has been abated by change of air. I should not recommend it for this purpose; but I have often witnessed its usefulness in shortening the stay of the distemper *after* its force was abated. I believe that change of air is seldom advisable (unless the patient be in a house particularly close and unventilated) during the active stage of whooping-cough; but when the violence of the complaint is subdued it is highly beneficial, particularly if the change be from a cold situation to one of a warm temperature, or when the coldness of winter and the bleak east winds of March are changed to the more genial warmth of spring and the mild western breezes of April and May. But even then much discretion is required to regulate the time and mode of exposure to the open air, otherwise ill consequences are likely to ensue."* Dr. Mackintosh remarked, in a severe epidemic, that all the children that were removed for change of air had the disease the longest. Dr. Beatty made it a rule to confine his patients to the bedroom until the cure was completed; and Dr. Graves seems to approve of his plan. Of the two extremes, doubtless it is the best. During the catarrhal stage, I have always confined the child to the house, and during the commencement of the second stage, unless the weather were very mild and dry. After this the child will benefit by an occasional walk or drive on fine days and during the warm parts of the day; then, when the cough is fairly on the decline, a change from town to the country will accelerate the convalescence. Great care should be taken that the rooms in which the child passes the day and night should be well ventilated and of a comfortable temperature. This will be particularly necessary in very severe cases, or in winter, because the child must then be confined altogether to the house.

The diet at first should be rather restricted; all stimulating food should be withheld, and cooling drinks allowed freely. As the second stage advances, the diet must be improved, broth or meat allowed according to the age of the child and its condition, and perhaps a little wine and water.

Treatment of the Complications.—A considerable deviation from, or addition to, the treatment already indicated, will be necessary when either of the complications I have described exist. It will not, however, be necessary to enter at length into the subject at present, as the reader will find all the details in the chapter on bronchitis, pneumonia, convulsions, &c. I shall mention so much of it only as will indicate the line to be pursued and the modifications required.

1. Whenever we detect the evidences of *bronchial* or *pneumonic* inflammation, it will be necessary, notwithstanding the whooping-cough, to adopt prompt and energetic treatment. Unless the child be greatly

* Underwood on Diseases of Children, p. 428. *Note.*

exhausted, we must have recourse to blood-letting, either by a free use of the lancet or by an equivalent number of leeches *arresting the bleeding when the leeches fall off*, or by cupping, if the child be old enough. Dr. Mackintosh states that he found great benefit from leeches applied over the larynx. After relief from bleeding, and as soon as the fever has somewhat subsided, a blister may be applied to the chest; and here let me repeat that I have found a succession of small blisters much more effectual with children than one large one, and also that we must be cautious not to leave them on too long, especially with infants, as the surface, when much inflamed, is apt to ulcerate. Two or three hours are sufficient for children up to five or six years of age; and although there may be no vesication when we remove it, it will take place afterwards. Let me add, that it is better not to cut the blister, unless its prominence makes the child uncomfortable, and that the best dressing, if the surface be not broken, is French wadding or cotton wool.

Internally, we must increase the quantity of ipecacuanha wine in case of bronchitis; but in pneumonia we must have recourse to tartar emetic in small doses, from its well known power over that disease. Either remedy may be added to the expectorant mixtures formerly advised, and continued so as to keep up a slight nausea, unless the bowels become affected. In such a case, we may try small doses of calomel and Dover's powder, or some antiphlogistic remedy. If the child be much weakened, the addition of ammonia to the expectorant mixture or its alternation with it, will be advisable. I have also seen great benefit from spirits of turpentine given alternately with the ipecacuanha or tartar emetic.

The bowels must be carefully regulated. Brisk purgation rather does mischief than good, but a gentle purgative now and then may be necessary. If there be diarrhœa, chalk mixture with aromatic confection and a very small quantity of laudanum, will be of use.

2. If the child be attentively watched, the second complication, *disordered bowels and remittent fever*, may, in most cases, be prevented. At each visit an accurate account of the state of the stomach and bowels should be obtained, and the treatment judiciously adapted to avoid these inconveniences. If the bowels be constipated, a brisk purgative may be given, followed by an enema, if the medicine be ineffectual. When the congestion about the head is considerable, it is often accompanied by obstinate constipation, which does not yield until the cerebral condition has been relieved by bleeding.

If the bowels be not constipated, but the discharges are unhealthy in colour or smell, which is by no means uncommon, mild laxatives, with small doses of hydr. c. cretâ or calomel, will probably excite beneficial action upon the mucous membrane, and restore the natural secretions. When diarrhœa is present and considerable, we must have recourse to some astringent medicine; chalk mixture, compound powder

of chalk, powder of chalk and opium, &c. I generally order the following simple mixture for a child of a year old :—

R.—Mist. cretæ, ʒj.
 Confect. arom. gr. v.
 Syr. zingib. ʒij.
 Tincturæ opii, gtt. ij.—M.
 Cap. cochl. i. parv. ter quarterve in die.

Increasing the quantity of laudanum if the child be older, and adding a little tincture of kino or catechu if the purging be obstinate. Gentle friction of the abdomen with compound camphor liniment and laudanum, or fomentations, are very useful. A small starch enema, with a few drops of laudanum, will often arrest the discharge after other measures have failed. I have also derived great benefit from hydrocyanic acid in this complication ; it decidedly diminished the irritability of the bowels at the same time that it acted beneficially upon the cough. The diet must be carefully guarded, nutritious, but not too stimulating, and rather of solid food than fluid, if the child be old enough. For the management of remittent fever I must refer to the chapter on that subject, as the only result of its being a complication will depend upon the constitution of the child.

3. With regard to the treatment of *convulsions* occurring in whooping-cough, the first thing is to remove the ordinary exciting causes, if they exist ; the gums should be freely divided, the bowels freed, and a warm bath administered. Notwithstanding, the convulsions will constantly recur, and in these cases there are two plans strongly recommended by Dr. Johnson : “ One is a total alteration of the child’s diet, and the other is change of air. When the child affected is at the breast, defectiveness in quantity or quality will usually be detected in the nurse’s milk. Often it will be found that she has menstruated, or, as sometimes happens, without the discharge actually occurring, she has experienced sensations similar to those which attend the accession of the catamenia. In such cases the milk almost uniformly disagrees, and hence it is a good rule, whenever the convulsive attacks withstand ordinary treatment, to inquire into the state of the nurse, and, if there be any ground of suspicion, to have a young and healthy one procured. Change of air often in the most remarkable manner puts a stop to the recurrence of convulsions, and will be found particularly beneficial in those cases of spasm of the glottis to which we have alluded.”

More active treatment than this will, of course, be necessary ; leeches to the forehead or behind the ears, cold lotions, and probably a blister to the nape of the neck, with a purgative, should immediately follow an attack of convulsions. If we succeed in mitigating their severity, it will be well to establish a permanent drain by a seton of two or three threads in the arm, as heretofore recommended. But in the majority of cases, all our treatment will be in vain, unless we can contrive

to lessen the frequency and violence of the cough ; the reiterated arrest of the circulation will shortly reproduce the convulsion. For this purpose I have found the hydrocyanic acid of great value ; if anything will check the cough, it will be either that or the belladonna. I have no doubt that even better effects will follow the inhalation of chloroform. I have only had one opportunity of trying it in one case, and that an unfavorable one, owing to the severity of the first convulsion from which the infant never recovered consciousness. The chloroform, however, checked every subsequent attempt to cough, and arrested several threatenings of convulsion. From the slight experience afforded by the case, I am quite prepared to use it in any similar ones.

These observations will apply as well to *hydrocephalus*, with the addition that, as the disease is more hopeless and more serious, our treatment must be more active, limited only by the state of the child's constitution, and by the recollection that, in the event of recovery from the complication, it has still a long and exhausting disorder to encounter. In addition to the leeching, cold applications, blisters, and purgatives, we must give a fair trial to mercury in whatever mode it is best borne by the child ; and if we are successful in controlling the secondary affection, a more liberal use of tonics, and a more generous diet will be necessary at an earlier period than usual.

4. When the symptoms of *cerebral congestion or apoplexy* make their appearance, no time is to be lost in abstracting a sufficient quantity of blood, and the effect of this first bloodletting will guide us as to the necessity for its repetition. If the stupor diminish, the intelligence return, and the child appear more conscious of what is passing, we may either repeat the bleeding, after an interval, or have recourse to counter-irritation, cold lotions, and purgatives.

If there be no return of sensibility, or diminution of the stupor or coma, the case is one of apoplexy from effusion, and with so powerful an exciting cause continuing as hooping-cough, it is not likely that any treatment will be of use. We may, as a matter of duty, try the remedies I have recommended for apoplexy, but it is most likely that they will altogether fail.

CHAPTER IV.

CROUP. CYNANCHE TRACHEALIS.

THE disease which is the subject of the present chapter consists, essentially, in inflammation of the larynx and trachea primarily, but which may occupy a greater extent of the respiratory organs; accompanied by a peculiar pellicular secretion, with a certain amount of spasmodic action, modifying the respiratory and vocal functions.

By the ancients it seems to have been confounded with other diseases of the air passages. According to Cheyne, Michaelis, &c., Baillon, of Paris, in 1576, was the first to indicate the anatomical characters of croup. Etmüller described a disease strongly resembling it, and after him Molloi, 1743; Malouin, 1746; Ghisi, of Cremona, in 1747, who called it *angina strepitosa*; Starz, in 1749 (*morbus strangulatorius*); Middleton, 1752; Bergius, 1755; Rudberg, 1755; Berghen, 1759; Wahlbom, 1761; and Wilcke, 1764. It was first noticed by its present name by Dr. Blair, of Cupar Angus, in 1718. In 1765, Dr. Home, of Edinburgh, published his essay, in which the disease was first accurately described, and from original observations. He was succeeded by several writers, among whom I may mention Eller, 1766; Engstroem, 1767; Rosen, 1771; Rush, 1769; Bard, 1771; Callisen, 1776; Buchan, 1776; Turnbull, 1776; Mahon, 1777; Middleton, 1780. Since this period numerous monographs of greater value have appeared, by Jurine, Albers, Vieussieux, Valentin, Cheyne, Bland, Bretonneau, Guersent, Trousseau, Desruelles, &c., and it has formed a very important chapter in the systematic works on diseases of children, besides being more or less described by writers on diseases of the respiratory organs. It has been described under various names, but I prefer the ordinary name "croup," as being generally intelligible, and as involving no pathological opinion.

It is one of the most alarming and fatal diseases to which children are liable; sudden in its attack, alarming in its symptoms, and rapid in its results, it sweeps over a family, leaving behind it distress and desolation. Generally speaking, it attacks children between the ages of one and twelve years, and most frequently those under five years. Marley mentions having seen it in an infant at the breast; * Hamilton in one of six or eight months; † Cheyne in one of three months; ‡ Bouchut in one of

* Diseases of Children, p. 139.

† Diseases of Infants, p. 142.

‡ Pathology of the Larynx and Bronchia, p. 15.

eight days old.* M. Andral gives the following table of ages in 332 cases. It occurred

During the 1st month in	1 case
" 3rd " "	1 "
" 5th " "	1 "
From 5 to 12 months	18 cases.
" 1 to 2 years	61 "
" 2 to 3 "	45 "
" 3 to 4 "	54 "
" 4 to 5 "	42 "
" 5 to 6 "	29 "
" 6 to 7 "	29 "
" 7 to 8 "	3 "
" 8 to 11 "	6 "
" 11 to 15 "	7 "
" 15 to 30 "	13 "
" 30 to 50 "	10 "
" 50 to 70 "	12 "

In thirty cases observed by M. Trousseau, thirteen were from eleven months to three years of age, eleven from three to five years, and six from five to twenty-six.†

"In Philadelphia, during the ten years preceding 1845, 475 deaths are reported from croup, in infants between two and five years; 238 in those between one and two years; 319 in those under one year; 112 in those between five and ten years; and six in children over ten years."‡

MM. Rilliet and Barthez state that primary croup is most frequent between the ages of two and seven years; and of eleven cases of secondary croup, six were from two to five years, and five beyond that age.§

Dr. Vauthier states that, of thirty-seven cases, twenty-five occurred at or under five years of age.||

Mr. Wilde observes, in his Report upon the Irish Census of 1841, "This fourth most fatal epidemic affection carried off 42,705, in the proportion of 100 males to 82.89 females. The registries of this disease afford returns of death up to the adult age, even so high as 30, and one at 40." From the fifth to the tenth year, the deaths amounted to 1316 males, and 1292 females. "Compared with other infantile diseases, the deaths during the first year are 100 to 48.29 of measles;

* Mal. des Nouveaux-nés, p. 265.

† Barrier, Mal. de l'Enfance, vol. i. p. 414-5.

‡ Condie, Diseases of Children, p. 332.

§ Mal. des Enfants, vol. i. p. 351.

|| Arch. Gén. de Méd., May, 1848, p. 10.

100 to 6.82 of scarlatina ; 100 to 92.62 of hooping-cough ; 100 to 4.98 of thrush ; and 100 to 60.1 of pemphigus.”*

From these details, it will be seen that it is not altogether confined to infants or children, but that adults, and even old people, are occasionally attacked, upon which M. Louis has published a valuable paper.†

There is another fact concerning croup, in direct opposition to what occurs in hooping-cough, alluded to in Mr. Wilde’s report, viz : that it is more frequent among males than females, and which is confirmed by general experience. Of M. Trousseau’s thirty cases, twenty-two were males and eight females; and of M. Jansecowich’s twenty-five cases, there were seventeen boys and five girls.

Different classifications have been made of the varieties of croup, according to the predominance of peculiar symptoms. Thus we have the catarrhal, the spasmodic, and the inflammatory croup of some authors ; the acute and spurious of Ferrier ; the three varieties of M. Bland, dependent mainly on the intensity of the attack ; the three species of M. Porter,‡ the spasmodic, the inflammatory, and a third, in which the lining membrane has become thickened and altered, so as to spoil the appearance of the organ and interfere with its functions. The commencement is insidious, its progress slow, and its termination fatal. Dr. Stokes divides croup into primary and secondary ; the latter being an extension of the disease from the neighboring parts, or a complication with other diseases.§ It appears to me, however, that most of these distinctions are only differences in degree, or the predominance of certain characters over others ; the only invariable one, if the disease be allowed to run on, being the inflammation and the false membrane. Experiments made by Schwilgue, Schmidt, Chaussier and others, have proved that the same causes, applied to animals of the same class, have given rise to each variety, according to the peculiar constitution and age of the animal.

The plan I propose, therefore, is to describe inflammatory or primary croup, as it ordinarily occurs ; then to speak of the modifications arising from the predominance of some one characteristic, as the spasm ; of its complications ; and lastly, of the secondary form of the disease, either owing to its extension, or to its complicating other diseases.

Symptoms.—The course of the disease has been divided into four stages by Gölis : the invading or catarrhal, the inflammatory, the albuminous, and the suffocative stage. Dr. Cheyne makes two stages : the incomplete or inflammatory, and the complete or purulent. Dr. Dewees three : the forming, the completely formed, and the conges-

* Report, p. 16.

† Recherches, Anat. Path., p. 263. Sur le Croup considéré chez l’adulte.

‡ Surgical Pathology of the Larynx and Trachea, p. 29.

§ Diseases of the Chest, p. 205.

tive stage. M. Guibert three: the stage of irritation, that of albuminous secretion, and that of suffocation. I prefer adopting that of Dr. Copland,* nearly the same as Dr. Stokes's, and shall speak, first, of the precursory stage; second, of the stage of development; and third, of the stage of collapse, or threatened suffocation.

1. *The Precursory Stage*.—As a general rule, some catarrhal symptoms precede an attack of croup. The child is cross and feverish, the skin hot, the pulse quick, the thirst increased; there may be sneezing, lachrymation, and cough. There is always a change in the voice, a degree of hoarseness, to which, as the surest sign of an approaching attack of croup, Dewees and others attach great importance. It is not, however, like the subsequent hoarseness, but rather an unusual huskiness, as though the throat needed clearing. If we examine the pharynx, we shall discover no trace of disease; the tongue is generally loaded but moist; there is evident uneasiness in the windpipe, and the cough is short and generally dry. The chest is resonant, and it is rarely that we can detect any morbid sounds with the stethoscope, and then only some slight bronchial râles. The rapidity of breathing will be in accordance with the amount of the fever, quickness of pulse, &c. In some cases it is greatly hurried, in others pretty quiet. Vieussieux lays great stress upon the catarrhal symptoms and change in the voice; but although the latter is very characteristic when present, many cases occur in which there is neither the premonitory catarrh nor hoarseness, but where the disease first appears fully formed.

The duration of the precursory stage is very uncertain, varying from a few hours to a day or two; as a general rule, it does not extend beyond eighteen or twenty-four hours.

2. *Stage of Development*.—After the symptoms I have mentioned have characterized the first stage, increasing towards evening; or without any warning in cases where the first stage is absent, the child is suddenly awoke out of sleep by a sensation of suffocation, with a hoarse ringing cough, hurried and hissing respiration, and a rough hoarse voice, with great alarm, agitation, and distress. Ferrier,† Cheyne,‡ and indeed most writers, have noticed, as a peculiarity, the first occurrence of the croupy cough at night, without giving any explanation of it. It seems probable that it may be another example of the disposition there is in nervous or convulsive attacks to occur in the night. After mentioning the setting in of this stage with “increase of fever, anxiety, and dis-

* Let me here, once for all, acknowledge my obligations to the learned and accurate work of Dr. Copland; to it and to the works of MM. Barrier, Rilliet and Barthéz, I am more indebted than to any others. My deep sense of their value must be my apology for the free use I have made of them.

† Med. Histories and Reflexions, vol. iii. p. 134.

‡ Pathology of the Larynx and Bronchiæ, p. 16.

tress, and by *indications of mechanical obstruction in the larynx itself*," Dr. Stokes remarks: "Indeed, one of the most remarkable circumstances connected with the disease is the rapidity with which this latter symptom shall occur, a fact strongly confirmatory of the opinion that the mere effusion of lymph is not the principal cause of the obstruction, but that it is owing to the inflammatory spasm of the part."* I have no doubt that thus early the dyspnoea and peculiarity of the cough are chiefly owing to spasm of the larynx, and, like similar nervous affections, they are peculiarly apt to occur in the night. "The child's illness," says Dr. Cheyne, "does not prevent him from going to sleep at the usual time; but he awakes with an unusual cough, suffocative, acute, and ringing. His breathing is difficult; often the inspirations, particularly those which follow the cough, are crowing. His face is swelled and flushed, and his eye is watery and bloodshot, and he seems in danger of suffocation; his skin is hot, and he has some thirst. He labors in breathing, and still the difficult and perhaps crowing inspiration continues, and the distinctive cough. He tries to relieve himself by sitting up or coming out of bed. No change of position gives him relief. Generally, his sufferings are thus protracted until morning, when, perhaps, there is a slight remission."†

The cough, then with the rough breathing and the hoarse voice, are the distinctive characteristics of this stage. The sound of the cough is so peculiar, that, once heard, it is never forgotten; it resembles slightly the crowing of a cock or the bark of a dog, but still more the succussions of air through a brazen tube; it has a ringing metallic tone in it. The breathing is evidently changed by the air being forced through a narrower orifice than usual, and the voice has a rough hoarseness even when quiet, but very marked when the child is crying. The paroxysms of coughing become more frequent and spasmodic, during which the inspiration is almost suspended and the heart's action accelerated. The difficulty of respiration and the consequent efforts on the part of the child are very great; the countenance is flushed, sometimes almost livid, and covered with sweat; the hands are clenched, the arms thrown about, all covering rejected, and whatever might impede the access of air is hastily removed. The body is sometimes erect, sometimes recumbent, and occasionally with the head rigidly bent backwards.‡ The eyes project, and are injected and suffused. The

* Diseases of the Chest, p. 208.

† Pathology of the Larynx and Bronchia, p. 15.

‡ This peculiar symptom is observed in several different diseases, and, among others, spinal arachnitis, pleuritis, pericarditis, &c.; and I have in vain striven to make out its exact import. In croup, however, it appears to be a mechanical arrangement to facilitate the passage of air by straightening the primary air-tubes.

carotid arteries beat strongly, the pulse is quick and hard, the skin burning, and the thirst great. The little patient refers the seat of distress to the larynx, to which the hand is frequently carried, as if to remove some obstruction, and where, as Dr. Ferrier has remarked, a degree of tumefaction is sometimes observed. As yet, there is scarcely any expectoration.

In a simple case of croup, the stethoscopic signs are chiefly of a negative character; the chest sounds clear on percussion; the respiratory murmur is hurried and unequal; the croupy sound and sibilant breathing are heard over the larynx. But occasionally the information is more positive. Dr. Stokes observes: "The active physical signs referable to the lungs, which I have had an opportunity of detecting, have been as follows: First, a diffuse sonorous râle, not so intense as to extinguish the vesicular murmur; secondly, the same râle, but with more intensity, indicative of disease in the more minute tubes; thirdly, a combination of the sonorous and mucous râles, causing a loud sound, and a feeling of vibration when the hand is applied to the chest; fourthly, the crepitating râle of pneumonia in one or both lungs; in some cases, with distinct dulness of sound on percussion. I have not heard the bronchial respiration of hepatization, or the frottement of pleurisy; but there can be no doubt that if these conditions existed before the laryngeal disease had obtained its maximum, these signs would be distinctly audible."* Several of these signs are referable to the complications of croup, as we shall see by and by. Dr. Williams notices a "weak respiratory murmur in the chest, which yet sounds well on percussion," and a "concave state of the intercostal spaces at each inspiration." He further states that "the sonorous inspiration of croup is audible through the stethoscope applied to the throat or upper part of the chest before it can be heard by the ear unapplied."† In addition, M. Barthez remarks that at a certain period of the disease, when the stethoscope is applied to the larynx, we may perceive a peculiar vibration, as of something flapping, which always indicates the existence of loose false membrane; and if this be confined to the larynx, it is so far a favorable sign that it announces the concretions to be slightly adherent, and capable of being removed by expectoration. If, on the other hand, this vibration be prolonged into the trachea and bronchial tubes, it is unfavorable, from the evidence it affords of the great extent of the disease. Thus, the physical examination of the chest may yield either positive or negative results of great practical value in the treatment of the disease, and at each visit we should make ourselves acquainted with its exact condition.

The symptoms already mentioned, the cough, dyspnoea, and hoarse-

* Diseases of the Chest, p. 214.

† Diseases of the Chest, p. 84.

ness, first appear and afterwards increase during the evening and night, along with the fever, and diminish in the morning, when we find the fever less, the cough not so frequent, perhaps less characteristic, and the inspiration less labored. This intermission may continue during the greater part of the day; but the exacerbation reappears towards evening, probably after a sleep, with greater severity than before. The cough, dyspnoea, anxiety and fever are increased; the hand is constantly applied to the throat to remove the obstruction; and the larynx, when pressed, is sometimes painful. The countenance is swollen, puffy, and flushed or livid; the eyes prominent and suffused; the expression that of agony. The pulse is quick, hard, and small; the skin is hot and dry, except the face and head, which generally perspire profusely during the fits of coughing. The child is restless, and constantly changing its position in the hope of finding relief. The respiration increases in difficulty, and the voice in hoarseness; the cough is sudden, convulsive, and ringing, terminating often in a crowing inspiration. There is little or no expectoration.

Arrived at this period, the progress of the disease becomes very rapid, and its advance is marked at every step by an aggravation of the symptoms. The remissions are less perceptible, the cough more difficult, suppressed, and strangulating; suffocation more imminent; and the paroxysms are occasionally followed by vomiting, and the expulsion of a glairy mucus, sometimes, but rarely, mixed with flocculent or membranous shreds, which affords temporary relief. The croupal respiration is permanent and increases, and if the lungs be unaffected, the ribs are drawn somewhat inwards, and towards the mesial line (as in atelectasis) instead of being protruded by the distended lungs; the voice becomes broken, whispering, and suppressed, partly from the pain it excites, and partly from its bringing on the cough. Deglutition is occasionally difficult, and gives rise to fits of coughing and strangulation. The bowels are generally constipated, and the urine sometimes clear, pale and abundant; in other cases, scanty, thick, and high colored, and occasionally whitish and turbid, particularly towards the close of the second stage.

It is during this second stage or period of development that the pathological peculiarity of the disease, the secretion of false membrane, occurs, but at what period, or by what symptom it is indicated, it is difficult to determine. M. Bland states that he has found the larynx and trachea lined with false membrane, in cases whose whole course did not occupy more than twenty-four hours, whilst in others several days elapsed before it was formed. The evidence derived from auscultation on this point is not always certain or precise. The vibration spoken of by M. Barthez is, I should think, pretty conclusive, but it is by no means common, and it is not easy to say whether the sonorous laryngeal inspiration is at the moment we examine, due to inflammatory spasm, to the mechanical obstruction of the false membranes, or

to both combined. M. Trousseau states that when the cough, having been clear, loud, and ringing, becomes less frequent, and at length almost without sound and suffocating, we may be certain that exudation has taken place.* Occasionally the expectoration will throw some light upon the matter. Early in the disease the child expectorates nothing, or a little frothy mucus; but in some more advanced cases shreds of lymph are thrown off, and on this account we should never omit to examine the sputa carefully. Dr. Hegewisch† recommends their being put into hot water to render them more apparent: they should always be placed in water for examination. No doubt this is a symptom of considerable importance, but, as Rilliet and Barthez have observed, it is far from being frequent, and rarely occurs after an advanced period of the disease, perhaps the day before death. In one of their cases it occurred on the fourth day. It does not appear, then, that we can lay down any symptom which will prove that lymphatic exudation has actually occurred, nor have we any evidence to show that this occurs at any regular period of the attack. It cannot be doubted that it does take place during the second stage, but the exact time seems to vary in different cases.

3. *Period of Collapse*.—This stage may set in from the third to the seventh day after the invasion, according to the intensity of the inflammation or the peculiar constitution of the child. It is characterized by the absence of any remission, by the aggravation of all the symptoms, especially the pulse and respiration, which are greatly accelerated, but with diminished power. The pulse is not only quick and weak, but often unequal and intermitting; the cough is less frequent, less sonorous, suppressed, and suffocative. The voice is low, whispering, or perhaps entirely abolished; the speech quick, imperfect, or lost. The respiration is extremely difficult, and accompanied with a loud hissing noise. All the muscles of inspiration are called into powerful action; thus the *alæ nasi*, the muscles of the neck, chest, diaphragm, and abdomen, all act with great force, and the movements of the larynx are extensive and incessant. The head is constantly thrown back, the forehead is covered with cold perspiration, the eyes are sunken and dull, and the complexion is livid, or of a leaden color. The surface generally is pallid, and the veins are very visible, especially those of the neck, which seem unusually distended. The tongue is dark-colored and loaded, the lips sometimes purple, in other cases of a livid paleness; the thirst is often intense, but can only be gratified at the risk of suffocation. The bowels are rather confined; the motions are dark and fetid.

There is generally some little expectoration, and it may be that, by

* Journal de Connois. Méd. Chir., 1834, p. 3.

† Rust's Magazine, vol. xxxii. p. 2.

great efforts, some shreds of the lymph may be thrown off from the larynx, with manifest relief for the time, but followed by a return of the distressing suffocation. The whole expression of the child's face, figure, and posture, is one of unmitigated distress, of the agony of oppressed breathing, of the horrid dread of suffocation. It turns on every side for relief, and finds none; it changes its position, lying down or sitting up, restless and anxious as those who strive for the breath of life, and despairing as those whose efforts are in vain. Awake or asleep, the distress continues; it finds no relief in the arms of its mother, no comfort in her caresses. From this condition the child rarely recovers; there may be occasional remissions, as I have mentioned, after the expectoration of mucus and lymph, but these are only temporary, and as the disease extends itself downwards, along the bronchial tubes, all chance is excluded. The local and general distress increases; the efforts at respiration partake of a convulsive character; the passage of air through the larynx becomes more and more difficult; and after a short time, seldom above twenty hours, death terminates the painful scene. The child may either expire with signs of convulsive suffocation, or it may fall into a state of stupor from exhaustion of the vital powers, and die lethargic. The younger the child, the more liable it is to have the disease terminate by convulsions. Occasionally, the disease terminates more suddenly than I have described; the child has appeared to be instantly suffocated just when the symptoms had become somewhat more favorable; and, in some of these cases, it has been owing to the partial detachment of the false membrane, and the formation of a valve whose closure proved fatal.

Such is the course of the severe form of croup, when uncomplicated and unchecked by treatment. It may, however, run a different and less fatal course. The fever may be slight, and the laryngeal affection much milder. Still there will be the sibilant and impeded respiration, the croupy cough, and the hoarseness, never to be mistaken when once they have been heard. These will be troublesome during the night, and perhaps there may be more or less complete remission during the day. No matter how slight the attack may be, the most vigilant care is requisite, as the disease very often acquires great intensity in a very sudden manner, and a very few hours lost can never be regained.

Or, if the treatment be early, active, and judicious, the disease may be checked in either the first or second stages, and we shall then find that the character of the cough will be changed; it becomes softer and more moist; the respiration, although for a time rough, is much easier and less hurried, and the voice acquires some tone; the case assumes the aspect of common catarrh, with hoarseness. I have seen this change take place in my own children in two hours, when the disease was attacked in the very commencement. In more severe cases the fever, with evening exacerbations, may continue for some time after the voice, cough, and breathing, have lost all croupy character. We

must never forget the great liability of the disease to relapse, nor cease our watchful care until the patient has perfectly recovered. It is also very apt to recur in the same individual. According to Jurine and Albers, it has been known to recur seven and nine times. I have seen it recur two, three, or four times. Nor can we be sure that every attack will be equally mild; a child may recover from two or three attacks, and be destroyed by the next. Much of the chance of recovery depends upon our seeing the disease at its commencement, for even the milder cases, if neglected, may assume greater intensity, and destroy the patient.

The *duration* of the disease depends partly upon the severity of the inflammation, and partly upon the vital energy of the child. It may prove fatal in twenty-four or thirty-six hours, as Dr. Hamilton mentions, or it may last nine or ten days. Dr. Cheyne states that it generally proves fatal on the third, fourth, or fifth day. Probably from three to six days will be found to include the greater number of cases.

Pathology.—The morbid phenomena exhibited on dissection, by the structures chiefly occupied by this disease, are the following:—
1. The mucous membranes of the larynx and trachea, in the majority of cases, show evidences of inflammation; they are of a bright red, vascular, and thickened, so that they can be peeled off easily. Occasionally the redness is partial, with patches of ecchymosis around the follicular orifices; and in some rare cases, as has been noticed by Albers and Jurine, Rilliet and Barthez, the mucous membrane is pale, and apparently perfectly healthy, underneath the false membrane. This Albers explains by supposing that the inflammation subsides after the peculiar secretion is accomplished. The orifices of the mucous follicles are often in a state of dilatation. Jurine remarks that they give the mucous membranes a dotted appearance, and that they are larger on the membranous portion of the trachea, in the direction of its longitudinal fibres, and in their intervals.

2. But the characteristic morbid appearance is the false membrane which lines the air-passages, lying upon the mucous membrane. We find a layer of lymph of considerable consistence, of varying thickness, and of a whitish or yellowish color, lining the larynx and trachea, and sometimes extending into the bronchi. This extension to the bronchial tubes occurred in forty-two cases of 120, according to M. Guersent, or in about one-third. In some cases it is of small extent, resembling grains or patches, between which we see the mucous membrane, and occupying different parts of the larynx and trachea; in others it forms demi-cylinders, or more rarely, entire cylinders, or tubes of different length; casts, in fact, of the tubes in which it is moulded. It is thinner and more fragile in the larynx than in the trachea, and its consistency is least in the bronchial tubes. The less the consistence, the greater the probability of its being expectorated. The free surface

of the false membrane is generally smooth, and often covered by a layer of muco-puriform matter. The other surface adheres more or less strongly to the mucous membrane. In some cases it is partially separated by puriform matter; in others an attempt to remove the false membrane brings away the mucous coat. When the secretion is extensive and general, it is generally less adherent; and when removed, the surface, which had been in contact with the mucous membrane is generally smooth, and of a whitish yellow color, with longitudinal striæ, owing, probably, to the impression of the muscular fibres of the trachea. On this adherent surface, also, we may sometimes see a number of small red points, which, according to M. Hache, correspond to the little ecchymoses of the mucous membrane which I have already noticed; and it has been doubted whether this may not be the commencement of organization in the false membrane. Soemmering, Royer, Collard, Guersent, Blache, and others, believe in the possibility, and have discovered vascular striæ which penetrate the substance: Portal, Valentin, and others, have denied the development of vessels. Rilliet and Barthez, without deciding positively, admit the possibility, but very sensibly remark, that such cases must be extremely rare on account of the rapidity of the disease. As to the chemical properties of the false membrane, I cannot do better than quote the following passages from M. Bretonneau's valuable work: "I have endeavored," he observes, "by means of different chemical reagents, to establish the differential characters of the croupal concretions, the albuminous concretions which are the consequence of inflammation of the serous membranes, and the fibrin of the blood, and I have not been able to discover any." "Sulphuric, nitric, and hydrochloric acids coagulate all; acetic acid, liquid ammonia, and alkaline solutions, dissolve all, and convert them into a diffuent and transparent mucus, exactly at the same temperature, and in the same vessel."* It consists, therefore, of albumen; and, according to Lelut, it is the mucus, enriched with fibrin, in consequence of the inflamed condition of the part. Dr. Hosack attributes the membrane to the rapid passage of the air. Dr. Seitz has recorded a microscopic examination of this membrane; it was about half a line thick, and of a slight consistence; it was seen to be composed almost entirely of pus globules, mixed with inflammation corpuscles, and a species of cell double the size of the pus globule, but otherwise similar to it.†

Instead of this plastic lymph, we occasionally find the air-passages inflamed, and to a greater or less extent lined with a layer of viscid puriform or muco-puriform matter offering, of course, an impediment to respiration, but more easily expectorated.‡

* *Traité de la Diphtherite*, p. 293.

† *Ranking's Abstract*, vol. iv. p. 334.

‡ *Dr. Francis, New York Med. and Phys. Journal*, vol. iii. p. 56.

It may be as well to notice here certain other morbid conditions, although they result from the complications of croup, which I shall notice by and bye.

The *pharynx* occasionally participates in plastic exudation, and on examination we find it either disposed in patches, or continuous and extending into the larynx. In almost all cases the *œsophagus* is healthy; in two cases related by Bretonneau, however, the false membrane lined the whole extent of the tube to a little beyond the cardiac orifice of the stomach. In one case, by Ferrand, it extended to the commencement of the *œsophagus*; and in another, reported by M. Lespine, it occupied the inferior third. It is rare to find any morbid appearances in the *stomach* or *bowels*. Rilliet and Barthez met with minute ecchymoses of the mucous membrane of the stomach, and a considerable development of the isolated follicles of the small intestines, but nothing more.

The *bronchial tubes* are often found inflamed, even when there are no false membranes; in some cases the mucous membrane is simply vascular; in others red and softened. Moreover, they contain a quantity of mucous or puriform fluid. In a larger proportion of cases, five-sixths, according to Rilliet and Barthez, *lobular pneumonia* exists, and occasionally it is general and extensive; nor does it depend upon the extension of false membranes to the bronchi, for it is present in many instances when they are absent. An *emphysematous* condition of the lungs exists in a large proportion of cases in consequence of the asphyxia; it is generally vesicular, in children.

Dr. Cheyne mentions that serous effusion and evidences of inflammation are occasionally found in the cavities of the *pleura* and *pericardium* in severe and protracted cases, and that the cavities of the heart are sometimes full of blood.

The *sub-maxillary* and *bronchial glands* are generally swollen and soft, and in one case Dr. Cheyne found a quantity of glutinous matter surrounding the thyroid gland, and passing from behind it round the trachea.

Now, from the morbid appearances I have mentioned, there cannot be much doubt of the pathology of the disease: that it consists of inflammation of the mucous membrane, giving rise to a peculiar secretion, and exciting spasmodic action; and the result is a great impediment to the ingress of air, to its access to the minute bloodvessels, and a less perfect aeration of the blood. Dr. Copland has given an admirable series of inferences from the *post-mortem* appearances, which I shall make no apology for quoting:—"1. That the mucous membrane itself is the seat of inflammation in croup; and that its vessels exude the albuminous or characteristic discharge, which, from its plasticity, and effects of temperature, and the continued passage of air over it, becomes concreted into a false membrane. 2. That the occasional appearance of bloodvessels in it arises from the presence of red globules in the fluid when first exuded from the inflamed vessels, as may be ascer-

tained by the exhibition, upon the approach of the symptoms, of a powerful emetic, which will bring away this fluid before it has concentered into a membrane; these globules generally attracting each other, and appearing like bloodvessels, as the albuminous matter coagulates on the inflamed surface. 3. That the membranous substance is detached in the advanced stages of the disease, by the secretion from the excited mucous follicles of a more fluid and less coagulable matter, which is poured out between it and the mucous coat; and as this secretion of the mucous cryptæ becomes more and more copious, the albuminous membrane is the more fully separated, and ultimately excreted, if the vital powers of the respiratory organs and of the system are sufficient to accomplish it. 4. That subacute or inflammatory action may be inferred as having existed, in connection with an increased portion of fibro-albuminous matter in the blood, whenever we find the croupal productions in the air-passages; but that these are not the only morbid conditions constituting the disease. 5. That, in conjunction with the foregoing—sometimes only with the former of them in a slight degree—there is always present, chiefly in the developed and advanced stages, much spasmodic action of the muscles of the larynx, and of the transverse fibres of the membranous part of the trachea, which, whilst it tends to loosen the attachment of the false membrane, diminishes, or momentarily shuts the canal (of the larynx) through which the air passed into the lungs. 6. That inflammatory action may exist in the trachea, and the exudation of albuminous matter may be going on for a considerable time before they are suspected, the accession of the spasmodic symptoms being often the first intimation of the disease; and these, with the effects of the previous inflammation, give rise to the phenomena characterizing the sudden seizure. 7. That the modifications of croup may be referred to the varying degree and activity of the inflammatory action, the quantity, the fluidity, or plasticity of the exuded matter, the severity of spasmodic action, and to the predominance of either of these over the other, in particular cases, owing to the habit of body, temperament, and treatment of the patient, &c. 8. That the muco-purulent secretion, which often accompanies or follows the detachment and discharge of concrete or membranous matters, is the product of the consecutively excited and slightly inflamed state of the mucous follicles, the secretion of which acts so beneficially in detaching the false membrane. 9. That a fatal issue is not caused merely by the quantity of the croupal productions accumulated in the larynx and trachea, but by the spasm, and the necessary results of interrupted respiration and circulation through the lungs. 10. That the partial detachment of fragments of membrane, particularly when they become entangled in the larynx, may excite severe, dangerous, or even fatal spasm of this part, according to its intensity, relatively to the vital powers of the patient; and that this occurrence is most to be apprehended in the complicated states of the malady, where the inflammatory action, with its charac-

teristic exudation, spreads from the fauces and pharynx to the larynx and trachea; the larynx being often chiefly affected in such cases, and, from its irritability and conformation, giving rise to a more spasmodic and dangerous form of the disease. 11. That the danger attending the complication of croup is to be ascribed not only to this circumstance, but also to the depression of the vital powers, and the characteristic state of fever accompanying most of them, particularly in the more advanced stages. 12. That irritation from partially detached membranous exudations in the pharynx, or in the vicinity of the larynx or epiglottis, may produce croupal symptoms in weak, exhausted, and nervous children, without the larynx or trachea being materially diseased; and that even the sympathetic irritation of teething may occasion the spasmodic form of croup, without much inflammatory irritation of the air-passages, particularly when the *prima via* is disordered, and the membranes about the base of the brain are in an excited state. 13. That the predominance in particular cases of some one of the pathological states noticed above (5) as constituting the disease, and giving rise to the various modifications it presents from the most inflammatory to the most spasmodic, may be manifested in the same case, at different stages of the malady, particularly in its simple forms and in the relapses which may subsequently take place; the inflammatory character predominating in the early stages, and either the mucous or the spasmodic, or an association of both, in the subsequent periods. 14. That the relapses which so frequently occur, after intervals of various duration, and which sometimes amount to seven or eight, or are even still more numerous, may each present different states or forms of the disease from the others; the first attack being generally the most inflammatory and severe, and the relapses of a slighter and more spasmodic kind; but in some cases this order is not observed, the second or third, or some subsequent seizure, being more severe than the rest, or even fatal, either from the inflammation and extent of exudation, or from the intensity and persistence of the spasmodic symptoms, most frequently from the latter circumstance."

We find, then, that the cause of the peculiar sound of the cough and sibilant breathing is not simply that the lining membrane is inflamed and coated with lymph, but also because the larynx and trachea are spasmodically affected, and it is most important to bear this in mind. Dr. Stewart remarks, that "the cough, or the peculiar sound so remarkable in expiration in croup, is observed to exhibit two kinds of sound: the first acute, from the active spasmodic contraction of the muscles of the larynx, excited at first by the column of expired air; the grave, which succeeds it, from the forced enlargement of the glottis, by the shock of the same column of air overcoming the contraction of the muscles."* Dr. Stokes considers the "cause of

* Diseases of Children, p. 75.

obstruction in this disease to be more spasm than effusion of lymph," and adduces in proof the temporary suppression of the sibilant breathing which follows vomiting.

It is not very easy to explain satisfactorily why children are so much more liable to the disease than adults. Dr. Cheyne considers that in the latter "the constitution is, in a great measure, secured from croup by the increase and vigor which the larynx and trachea acquire at puberty." This might explain their immunity from spasm, but surely not from inflammation and the exudation of plastic lymph. Dr. Stokes suggests that it may be owing to the preponderance of white tissues in children, and to these tissues possessing the greatest reproductive power. "In the child, too, there may be a greater relation between the physiological, and consequently the pathological states of the mucous membrane of the larynx and trachea, and their subjacent (white) tissues, than in the adult; and the same condition which determines the progressive development of the larynx up to the period of puberty, may also predispose the mucous surface to the plastic or formative irritations."* I confess I do not think the explanation altogether satisfactory, nor have I any better to offer. I may add the fact that the disease attacks animals: dogs, cats, lambs, horses, and cows, according to Duval, Bush, Valentin, &c., especially the young; and a similar disease is said by Duval, Jurine, Albers, Porter, &c., to have been induced by the injection of stimulating fluids into the trachea.†

Causes.—The principal causes appear to be constitutional aptitude, exposure to a cold, damp, changeable atmosphere, insufficient clothing, and epidemic miasma. No doubt that children of an irritable, nervous habit, and great susceptibility, are the most liable to its attacks. Contrary to M. Barrier's statement, children are very liable to a return of the disease, and different children in the same family sometimes share the liability. One of my own children had three or four attacks, and another two; the predisposition has ceased, however, with advance in age. There does not appear to be any ground for attributing it to hereditary influence.

It prevails much in countries or localities exposed to great vicissitudes of weather: Savoy, Switzerland, the east of England, north-west of Europe generally, the middle and south of France, the north of Italy, &c., are countries in which it is very prevalent. In towns, too, it is more frequent than in the country; it is common in London, Edinburgh, Leith, Dublin, &c.; and more so in the low, damp parts of towns. I am informed that it is rare in the north of Ireland; but Underwood mentions that it infests Mullingar. It is more common

* Diseases of the Chest, p. 211, *note*.

† Valentin, *Sur le Croup*, p. 464.

during winter than summer, owing, probably, to the frequent changes of weather, and the prevalence of east and north-east winds. I have no hesitation in saying that the fashion of clothing children lightly, exposing their legs, arms, and necks, under the foolish notion of hardening them, is extremely favorable to the production of croup. Dr. Eberle has given a striking illustration of this in the case of a German settlement in America, "who are in the habit of clothing their children in such a manner as to leave no part of the breast and lower portion of the neck exposed. During a practice of six years among this class of people, I recollect having met but a single case of this affection, and this case had occurred in a family who had adopted the present universal mode of suffering the neck and superior portions of the breast to remain uncovered."*

The suppression of cutaneous eruptions, the breathing of noxious gases, swallowing boiling water, &c., are all occasional causes of the disease. It may attack children in perfect health, or those whose constitutions have been weakened by previous disease; and it not unfrequently occurs during an epidemic of influenza or scarlatina, primary in the first, secondary in the latter, or as an extension from the neighbouring parts.

Lastly, it has prevailed epidemically at different times to a considerable and fatal extent. The principal epidemics of which we have authentic account are those of Paris, in 1556 (Baillou); Cremona, in 1747 (Ghisi); Cornwall, in 1748 (Starr); Upsal, in 1762 (Rosenstein); Frankfort, in 1764 (Van Bergen); Sweden, in 1768-72 (Wahlbom and Baeck); Wertheim, in 1772 (Zobel); in Galicia, in 1778 (Hirschfeld); Clausthal, in 1783 (Boehmer); United States, in 1805 (Barker); Stuttgart, in 1807 (Autenrieth); Saxony, in 1807-8 (Albers); and in 1811 (Schundtmann);† at Vienna, in 1807-8 (Gölis); and in Maryland, in 1807 (Chatard). Several partial or local epidemics have since occurred, but none so general as the above, that I am aware of. Dr. Vauthier has published an account of the epidemic which prevailed in the Hôpital des Enfants at Paris in 1846-7.‡

Several authors, as Wichman, Boehmer, Field, and others, maintain the contagiousness of croup; but this is denied by the majority of writers, at all events in the case of primary croup. Certain forms of diphtheric inflammation of the fauces and pharynx are undoubtedly contagious; and as the inflammation and exudation sometimes spread to the larynx, constituting secondary croup, it may be so far regarded as sharing in the same mode of propagation.

* Diseases of Children, p. 347.

† Albers, de Trachæitide, p. 70. Valentin, Sur le Croup, p. 402.

‡ Archiv. Gen. de Med., May and June, 1848.

Modifications and Complications.—I shall now proceed to consider the modifications of croup, *i. e.*, croup with certain of its symptoms predominating sufficiently to give a peculiar character to the attack.

I. Croup with Predominance of Inflammatory Symptoms.—The acutely inflammatory croup of some authors.—This is nearly the severest form of the disease, attacking plethoric children of a sanguine temperament, and perhaps at a more advanced age. It is preceded by chilliness, horripilation, and rigors, and characterized by a more continuous and unremitting severity of symptoms, by strength and rapidity of pulse, heat of skin, difficult and forcible respiration, redness or lividity of cheeks and lips, and the inflammatory appearance of the blood taken from the child.

When limited, as it may be, to the larynx, it has been called by Guersent and others *laryngeal croup*, and the symptoms connected with the respiration, voice, and cough, are peculiarly severe; the pain and swelling of the larynx are remarkable, and convulsions occasionally occur. The attack may terminate fatally in twelve hours, or be prolonged to four or five days, but rarely longer.

On the other hand, the disease may be confined to the trachea, constituting the *tracheal croup* of continental writers, and having a less rapid and less fatal progress, with some variation in the symptoms. For instance, although the cough and breathing are sonorous, they have not the brazen sound of ordinary croup, and the voice is far less affected; the sense of suffocation is not so oppressive. Pain, or a burning sensation, is felt along the trachea; the croupy sounds of breathing will be heard if the stethoscope be applied over the trachea, and there is severe inflammatory fever present. The attack may be prolonged to twelve or fifteen days; and in some cases it has subsided into a chronic form, or passing downwards, has terminated in bronchitis.

II. Croup with a Predominance of Nervous or Spasmodic Symptoms.—The attack may come on like ordinary croup, with feverishness, cough, &c.; or, as I have more frequently found, the child may go to bed perfectly well, and in the course of an hour or two may awake with perfectly formed croup, hoarse voice, ringing cough, dyspnœa, and threatened suffocation, which, if not relieved by treatment, will continue during the night, and have a remission during the day. There is, on the whole, less fever, but not less distress; and if the attack be neglected, it will run a course similar to ordinary croup, characterized by greater dyspnœa, louder cough, and more sibilant respiration, and prove fatal, as in the other forms.* Fortunately, if taken early it is far more manageable; the spasmodic irritation may be relieved before

* Blaud, *Recherches sur le Croup*, p. 312.

there has been time for false membranes to form, and with the relief of the spasm the inflammation may either disappear or be modified. Thus, with my own children, I have repeatedly subdued the croupal affection in the course of two hours, and there remained only catarrh with hoarseness.

Now let us notice the diseases with which croup may be complicated, or, in other words, its secondary affections. These are not numerous, but they add much to the severity and danger of the disease.

I. *Bronchitis*.—I have already mentioned that morbid appearances indicating inflammation of the bronchial tubes are found even in cases where the croupy exudation does not extend below the trachea; and, in practice, we find that this complication is not very uncommon. It seems more frequent in young and delicate children, and is marked by the predominance of catarrhal symptoms from the beginning generally. We find the croup, dyspnœa, and hoarseness much as in an ordinary case; but there is more wheezing in the chest, and more expectoration. There is generally less fever, the skin is cooler, and the throat and larynx seem less permanently the seat of the mischief. After three or four days, the cough is softer, the paroxysms shorter, and the expectoration increased. If the croupy sounds be not very loud, we shall be able to hear bronchial râles in one or both lungs. The chest is resonant on percussion.

In the progress of the attack, either affection, the croup or the bronchitis, may predominate, and give to it its peculiar character, *i. e.*, it may merge into a case of marked croup, such as I have described, with some bronchitic symptoms, or it may degenerate rather into a bronchitic affection, with very little of croup. The latter is much safer, for in the former we have the danger from the croup augmented by the disease of the air-tubes.

II. *Pneumonia*.—This disease complicated five-sixths of the cases collected by MM. Hache and Rilliet and Barthez; and, according to the observations of Blache, Guersent, Trousseau, and others, it is the most frequent complication of croup; and I need not say how fearfully it increases the danger of the primary disease. It seldom occurs at the commencement of the disease, or during the precursory stage, but makes its inroad in the course of the second, or towards its termination.

The pneumonia may be either general or lobular, and this, together with the loud croupy sound, renders its detection often extremely difficult. We ought to examine the chest daily, to seize upon a moment of comparative quiet; and, if we can avail ourselves of the temporary suspension which follows vomiting, as suggested by Dr. Stokes, we may be able to detect the crepitant râle in the portion of the lung occupied by the inflammation. The only symptoms which will indicate the deeper mischief will probably be an increase of fever, and a more rapid sinking

of the vital powers. The cough is sometimes less ringing; but the sibilant breathing, the hoarseness, and the fever are as well marked as in the other cases. The disease thus complicated runs a very rapid and almost universally fatal course, without remission or mitigation.

III. Other complications have been noticed, but they occur much less frequently; thus, Cheyne, Condie, and others, mention the occurrence of *pleuritis*; several authors speak of *emphysema*; others of partial *rupture of the trachea*; and Martin* of a case in which *vomiting of blood occurred*.

Secondary Croup.—So much for the complications of croup; but we must not forget that croup may complicate other diseases, and be to them a secondary affection. Thus, for example, in some cases of diphtherite, cynanche maligna, scarlatina maligna, cynanche tonsillaris, or cynanche pharyngea, the inflammation, which, in those parts, gives rise to the ash-colored or whitish membranous exudation, may extend itself to the larynx and trachea, giving rise to croup, and adding a formidable complication to the primary affection. Again, croup, though rarely, supervenes upon thrush; in this case it takes its character from the state of the constitution induced by the primary disease, and, generally speaking, the pharynx and larynx are more severely implicated than the trachea. The accompanying fever is of an ataxic or adynamic type.† It also occurs in the course of several of the exanthemata; during the first or eruptive stage of measles, miliary eruption, scarlatina as I have mentioned, smallpox, &c., according to the testimony of many authors. In the latter case it comes on most frequently during the suppurative stage of confluent smallpox, and, as in diphtherite, the inflammation extends from the pharynx to the larynx. Some cases of erysipelas of the fauces, in which the extension of the inflammation gave rise to croup, are related by Forester, Latour, Stevenson, and Gibson. Dr. Vauthier relates eight cases of secondary croup out of thirty-seven. Three, complicated measles; two, pneumonia and typhoid fever; one, scarlatina; and one, hooping-cough.

The morbid changes discovered after death in secondary croup are of the same character as in the primary affection, but less marked; there is less redness; the softening or thickening of the mucous membrane is less extensive; the false membranes are yellowish, and of smaller extent, thinner, less adherent, and softer than in the disease just described. They seldom occupy the entire larynx, but often the inferior portion of the epiglottis, and the superior part of the larynx,

* Rec. Period. de la Soc. de Méd. de Paris, April, 1810.

† Med. Obs. and Inq. by Dr. Rush, vol. ii. p. 376. Ferrier, Med. Histories and Reflections, vol. iii. p. 205.

as far as the chordæ vocales, or the ventricles of the larynx. In one case out of eleven only did Rilliet and Barthez detect them at the inferior portion of the trachea, and in another in the bronchial tubes.

The symptoms of the secondary croup are a good deal modified, and resemble more some of the forms of laryngitis. Thus, the cough is sometimes dry, sometimes moist, easy, or painful and hoarse, but it has less of the metallic ringing sound; the respiration is difficult and hissing, but without the loud sibilant sound of primary croup; the voice is less changed. Rilliet and Barthez mention that in five of these cases it was unaltered; in two others it was nasal, embarrassed, but not extinguished; in three it was muffled, and in one it was extinct; without any peculiarity in the situation of the false membrane to explain the difference. The expectoration varies; there may be some mucous or muco-puriform matter thrown off, but there are rarely or never any shreds of lymph. On inspecting the fauces, however, in these cases, we shall find there the primary affection in the form of inflammation (and perhaps ulceration) of the tonsils, uvula, and palate, with a gray or yellowish exudation of lymph; the parts are swollen, and of a dark red color, and there is considerable difficulty in swallowing.

Dr. Stokes has given a comparative view of the symptoms of primary and secondary croup, which I shall take the liberty of extracting:—
 “1. In primary croup the air-passages are primarily engaged; in secondary croup the laryngeal affection is secondary to disease of the pharynx and mouth. 2. In the former the fever is symptomatic of the local disease; in the latter the local disease arises in the course of another affection, which is generally accompanied by fever. 3. In the former the fever is inflammatory; in the latter typhoid. 4. In the former there is necessity for antiphlogistic treatment, and the frequent success of such treatment; in the latter, incapability of bearing antiphlogistic treatment, necessity for the tonic, revulsive, and stimulating modes. 5. The former is spasmodic, and in certain situations endemic, but never contagious; the latter, constantly epidemic and contagious. 6. The former is a disease principally of childhood; by the latter, adults are commonly affected. 7. In the former the exudation of lymph spreads to the glottis from below upwards; in the latter from above downwards. 8. In the former the pharynx is healthy; in the latter it is diseased. 9. In the former, dysphagia is either absent or very slight; in the latter it is constant and severe. 10. In the former, the catarrhal symptoms are often precursory to the laryngeal; in the latter, the laryngeal symptoms supervene, without the pre-existence of catarrh. 11. In the former, the complication with acute pulmonary inflammation is common; in the latter, rare. 12. In the former, the absence of any characteristic odour of the breath; in the latter, the breath is often characteristically foetid.”*

* Diseases of the Chest, p. 206.

Diagnosis.—The pathognomonic symptoms of croup are the hoarse voice, the sibilant breathing, and the rough metallic ringing cough ; which, in the third stage, become the whispering voice, wheezing, hissing respiration, and husky, choking cough.

1. It may be distinguished from *spasm of the glottis* by the catarrhal stage, by the hoarse voice, by the sibilant respiration, and by the ringing cough ; in spasm of the glottis there is no catarrh, inspiration only is difficult ; the crowing sound is quite different from the expiratory noise in croup ; there is no cough, and the voice is unaltered.

2. In *simple laryngitis* the cough and voice are rough and hoarse, but very unlike the ringing, metallic cough of croup ; the respiration is sometimes difficult, but rarely, if ever, sibilant ; there is fever, expectoration, and no such paroxysms of suffocation as in croup.

3. *Primary croup* differs from secondary croup in the absence of sore throat, inflamed fauces covered with false membrane, the peculiar characters of the original disease, and in the greater intensity of the symptoms, fever, dyspnœa, and cough. I have already given Dr. Stokes's parallel between the two affections.

4. In *pertussis* there is hurry of respiration, but neither the difficulty nor the sibilant sound ; the cough, though loud, has not the peculiar metallic sound, and in the intervals there is complete relief, neither hoarseness nor dyspnœa.

5. If the previous history were obscure, it might be possible to mistake the symptoms resulting from *foreign bodies in the trachea* for croup, but a careful inquiry will generally remove the difficulty, and, in addition, the suddenness of the attack, the absence of false membrane and of inflammatory fever, with the results of auscultation, will leave but little doubt.

6. It is, perhaps, impossible to draw the line between croup and the *laryngitis resulting from swallowing boiling water*, as in the latter case there is an exudation of lymph firmly adherent to the membrane of the larynx ; it never, however, extends to the trachea ; and although the swollen membrane impedes respiration, still the spasmodic paroxysm is wanting. Our best guide will be the previous history of the case.

Terminations and Prognosis.—1. Croup may terminate favorably in resolution: the fever diminishes, the croup becomes softer, loses its croupy sound, and resembles the cough in a slight attack of laryngitis ; the respiration gradually becomes easier, and expectoration takes place. "Most commonly," says Dr. Cheyne, "after the disease has arrived at its height, the decline is, as it were, a retrogression of the attack ; the skin is moist, the fever abates ; the cough becomes loose, the breathing easy, and the voice gradually recovers its natural tone." Sometimes the crisis is marked by the expectoration of false membrane, but this is not always a proof that the disease will subside.

2. The inflammation may subside in the larynx, but extend itself

downwards to the large or small bronchial tubes, and the croup will then merge in bronchitis or pneumonia.

3. In the majority of cases, croup ends fatally with the symptoms I have already detailed. Marley states that two-thirds die. Vieussieux in 1775, states that, in his early practice, ten cases out of twenty died; Jurine, that one in ten die; Michaelis and Bard, two out of three. In Philadelphia, during the ten years preceding 1845, there occurred 1150 deaths from croup, or 150 per annum. In Paris, in 1838, the deaths were 187; in 1839, 286; and in 1840, 326. In London, in 1840, the deaths from croup amounted to 391; and in all England, to 4336. Sudden deaths, as I have already stated, may occur from the partial detachment of a valve of false membrane, but ordinarily the cause of death is a deficiency of air, and consequently the patient dies of asphyxia.

The *prognosis*, therefore, in all cases of croup, is very serious; the probabilities are against recovery, but in estimating those probabilities we must take into careful consideration the period of the disease at which the child comes under treatment, the intensity of the symptoms, the degree of fever, the complications and the extent of the disease, and the strength of the constitution. If the disease be attacked at the very commencement, it is by no means an unmanageable or fatal disease, but will in most cases yield to appropriate treatment: nay, if it be further advanced before we see it, yet if it be a mild case, the symptoms marked but not violent, the inflammation limited, the fever moderate, and no complication, the child may recover under proper care.

But if the attack be rapid and severe, the cough violent, the dyspnoea intense, and the fever high, and especially if the lungs be affected, and time has been lost, there will be but little hope from treatment at any period; none if the case has been overlooked for twenty-four hours. I cannot quite agree with Rilliet and Barthez that we ought never to despair of the life of the patient in croup, nor do I anticipate as much benefit from tracheotomy, even as a last resource, as those excellent practitioners; but certainly there are some cases of recovery recorded when all hope seemed extinguished, and they appear to have been mainly owing to the strength of the patient's constitution.

Treatment.—The indications of cure are: 1. If we are called early, to arrest or subdue the inflammatory action, and to prevent the formation of false membranes, or the albuminous secretion and accumulation in the air-passages; 2. When the time for doing this has passed, to procure the discharge of these matters; 3. To mitigate the spasmodic symptoms; and 4. To support the powers of life in the latter stages, so as to enable the system to throw off the matter exuded in the trachea.

Our success in the first of these indications depends, I think, upon seeing the child early; if we are present at the very beginning, we may

almost always cut short the disease. My own children, for example, have been attacked ten or twelve times. I always give immediately an emetic of tartarized antimony, and afterwards smaller doses to keep up the nausea for an hour or two. In no instance has bleeding been necessary after this, and the attack has never lasted more than two or three hours. We should in the first stage, commence by an emetic of ipecacuanha or tartar emetic, and keep up a nausea for some time by smaller doses. "Emetics," says Dr. Cheyne, "appear peculiarly fitted to answer the indications of cure in the first stage of croup. They increase the secretion from the mucous membrane of the bronchia, while, at the same time, they lessen the general tone of the arterial system. Hence they are the only true expectorants."* M. Valleix states that of 31 cases in which emetics formed the basis of treatment, 15 recovered, while of 22 in which they were rarely given, but one recovered. By most practitioners the tartar emetic is preferred, and I think with reason, because of its peculiar antiphlogistic power; it may be given in doses of a quarter of a grain every quarter of an hour, until vomiting is excited, and then continued in doses of an eighth or a twelfth of a grain every hour or two. Some German physicians, as Droste, Kerting, and Steinmetz, prefer the sulphate of copper; and Smith, Farre, and Francis, recommend the sulphate of zinc. Dr. Meigs uses alum, and speaks most highly of it in doses of a teaspoonful of the powder in honey or syrup, and repeated in a quarter of an hour, if it do not excite full vomiting.† Dr. Hubbard prefers the turbith mineral (subsulphate of mercury) for this purpose.

In the severer cases, or when the emetic fails in changing the character of the disease in an hour or two, we must have recourse to blood-letting. There is no difference of opinion as to the propriety of this practice, but merely as to the mode. Some advise bleeding from the arm or jugular vein, as Marley, Cheyne, Porter; others, as Dr. Merri-man, cupping; whilst by the majority leeches are employed. Whatever method we adopt, the essential point is to take as much blood as will make a decided impression on the disease, and to repeat the bleeding if necessary. I prefer leeches applied to the upper part of the sternum, where the bleeding can be readily arrested by pressure; and I repeat that it ought to be arrested when the leeches fall off. I quite agree with Dr. Condie that "there is certainly no disease in which bleeding, when well timed, and carried to a sufficient extent, is calculated to produce more beneficial effects than in croup. The practitioner who, in violent cases, neglects this important measure, and places his hopes in any other remedy, or combination of remedies, will have but little reason to flatter himself upon his success in the management of

* Pathology of the Larynx and Bronchia, p. 51.

† American Journal of Med. Sciences, April, 1847, p. 290.

the disease.”* The quantity of blood taken must vary according to the intensity of the disease, the strength of the child, and the effects produced. It is not desirable to carry it to excess in any stage, but in the first stage it is less mischievous to take too much than too little.

In the eighth volume of the *Dublin Medical Journal*, and more recently in his *Clinical Medicine*, Dr. Graves has called attention to the treatment proposed by Dr. Lehman, of Torgau. It consists in the immediate application of hot water in the following manner: “A sponge, about the size of a large fist, dipped in water as hot as the hand can bear, must be gently squeezed half dry, and instantly applied beneath the little sufferer’s chin, over the larynx and windpipe; when the sponge has been thus held for a few minutes in contact with the skin, its temperature begins to sink, and it requires to be dipped again in hot water.” This is to be continued from ten to twenty minutes, and will produce a vivid redness, as if a sinapism had been applied, accompanied with a general perspiration, and followed by immediate relief of the cough, hoarseness, and dyspnœa. “Since then,” Dr. Graves observes, “I have repeatedly treated the disease on this plan, and with the most uniform success. It is, however, only applicable to those cases which are seen at the very onset of the disease; and you must remember, also, that I do not propose it to the total exclusion of bleeding and tartar emetic, which must be used in the more aggravated cases, or in those which are not seen until the disease is somewhat advanced.”†

The bleeding may be preceded or followed by a warm bath, which, for a time, relieves the oppression, and certainly gives greater effect to the other remedies; and it is peculiarly beneficial when the disease is yielding to the treatment.

Dr. Horace Green, of New York, has proposed the local application of nitrate of silver in croup, as well as in other laryngeal affections. Ordinarily he uses a solution of from two scruples to a drachm of the crystals of nitrate of silver in an ounce of water, and he applies it at first to the fauces and glottis, and afterwards within the larynx, by means of a small piece of sponge fastened on a curved rod of whalebone. “The instrument being prepared by suitably saturating the sponge with the solution to be applied, and the head of the child being firmly held by an assistant, and the base of the tongue depressed by a spoon or any other suitable instrument, the operator carries the wet sponge quickly over the top of the epiglottis, and on the laryngeal surface of this cartilage; then pressing it suddenly downwards and forwards, passes it through the opening of the glottis into the laryngeal

* Diseases of Children, p. 305.

† Clinical Medicine, Lecture xxxix., vol. ii. p. 4. Second edition.

cavity.”* This Dr. Green says does not produce the amount of irritation we should expect, and he considers it suitable to every stage either of simple or complicated croup. He has given several cases, in which this treatment succeeded. Dr. Blakeman of New York has recorded two cases in which it succeeded; the first requiring three, and the second two applications of the solution.† Dr. Clarke has related six cases thus treated, of which four recovered, and two died.‡ Dr. Latour has used the solid nitrate of silver to all the parts within reach, and afterwards contrived to squeeze some of the solution into the larynx. The child recovered.§ Dr. J. F. Meigs, of Philadelphia, used a solution of nitrate of silver (gr. x to ʒj) to the fauces, applied with a camel’s-hair brush. He does not, however, seem to attribute much of his success to this application.|| Dr. Townsend proved it of great use in one case.¶

These are the principal means at our command during the first stage, and it is necessary to use them promptly and vigorously, for, as Dr. Ferrier observes, the course of genuine croup is very short. If the alarming symptoms I have described are not mitigated during the first twelve hours, the disease will generally prove fatal. It has happened several times that I have been called in the day to patients who had become seriously ill only on the preceding evening; and in such cases I have only succeeded once. The proper time for administering relief is when the cough, dyspnœa, and palpitation increase towards ten or eleven o’clock in the evening.

In the *second stage* it will be well to have recourse to an emetic, and certainly to bleeding, if it have not been practised before. Dr. Cheyne recommends the employment of tartar emetic in quarter or half grain doses, every hour, so as to excite vomiting occasionally. In this practice, Dr. Stokes agrees; he dissolves a grain of the salt in an ounce of distilled water, and gives a dessert spoonful every quarter of an hour, or every half-hour, as the case may be. Mr. Porter rather prefers nauseating doses of this remedy to those which occasion repeated vomiting, and I am inclined to think that after the emetic effect has been at first excited, and kept up for an hour or two, as much good will be derived from the smaller doses. On the other hand, we must not forget that with some children tartar emetic produces a very depressing effect. Dr. Stewart mentions that he has known “utter and irrevocable prostration and death quickly ensuing from

* Observations on the Pathology of Croup, p. 83.

† New York Med. and Surg. Reporter, &c., October, 1847.

‡ American Journal of Med. Sciences, April, 1859, p. 360.

§ Gazette Méd., August and October, 1846.

|| American Journal of the Med. Sciences, April, 1847, p. 290.

¶ Ibid., July, 1851, p. 85.

its use in young children," and in such cases it may be combined with oxymel of squills, or ipecacuanha may be substituted for it without danger of similar effects.

Drs. Rush, Hosack, Bard, and other practitioners, have attached great value to calomel, alone, or in combination with Dover's powder. Dr. Cheyne does not think it of much use; during two seasons, in which he had used it freely during the second stage, all the cases terminated fatally. Dr. Stokes observes, that the mercurial treatment of croup is insufficient and unnecessary. The uncertainty of the action of calomel, the difficulty of producing ptyalism in violent acute inflammation, the shortness of the period for the exhibition of the remedy, and the various injurious effects of mercurial action on the system at large, are sufficient reasons against the employment of this treatment in the croup of children; and when we have so valuable a remedy as the tartar emetic, it seems scarcely justifiable to tamper with the case by the attempt to produce mercurial action.* Certainly, as a substitute for tartar emetic, it would be of feeble and doubtful value; but I have seen much benefit from it after the vomiting or nausea had been kept up for some time, or when the depressing effects of the latter had been too decided to permit its prolonged use. MM. Bretonneau and Guersent have repeatedly succeeded by the mercurial treatment carried to ptyalism; but the latter author cautions us against its use in weak or debilitated constitutions. Mr. Porter speaks well of it "in long-protracted and chronic cases, when there is a tendency in the mucous membrane to become thickened and changed in structure."† I have generally given it in combination with James's powder and a minute portion of Dover's powder, say half a grain of each of the former, with a third of a grain of the latter every three or four hours. Eberle prefers the combination of calomel with tartar emetic, in the proportion of four or six grains of the former with a fourth of a grain of the latter, every fifteen minutes, until vomiting is excited, in the case of children from two to five years old. He further states that he "administered the lobelia inflata, with a view to its emetic operation, with the happiest effects."‡ With the same object, decoction of senega, sulphate of zinc or copper, have each its advocates.

Counter-irritation is certainly of great use, but some difference of opinion exists as to the best course. Some prefer strong liniments to the throat and chest. Dewees recommends turpentine, hartshorn, or the mustard and vinegar poultice. Others, as Drs. Ferrier, Underwood, &c., recommend the application of a blister; but Mr. Porter objects to these, on account of the time required to produce their effects, and on account of the danger of applying them in the imme-

* Diseases of the Chest, p. 218.

† Surgical Pathology of the Larynx and Trachea, p. 45.

‡ Diseases of Children, p. 359.

diate neighbourhood of inflammation, but he admits their value when the lungs are congested.* Rilliet and Barthez, and Bouchut disapprove of them as rarely useful, and they mention that the denuded surface is sometimes covered with an exudation resembling that in the larynx. During the first stage, and the early part of the second, I conceive that blisters are quite inadmissible; but after the employment of bleeding and tartar emetic, and the lowering of the system by these means, especially if there be any tendency towards bronchial complication, I have certainly seen benefit from the mustard poultices and blisters.

The action of purgatives upon the system generally, and upon the local disease, is beneficial, and should, therefore, never be neglected; but we cannot depend upon them as a main part of the treatment. If neither the tartar emetic nor calomel act upon the bowels, some brisk warm cathartic should be given; but, on the other hand, should diarrhoea result from the above treatment, it must be controlled by some astringent and cordial medicines.

Now if, under this treatment, the disease give way, and the cough become softer, the breathing easier, and the fever less, we may diminish the frequency of the doses and their amount, or we may simply confine ourselves to expectorant remedies, decoction of senega, squills, ammonia, and small doses of ipecacuanha, &c., with an occasional warm bath, and a little James's powder two or three times a-day, so long as the fever lasts, with due attention to the stomach and bowels, and a careful regulation of the diet.

But suppose the symptoms continue unmitigated, and there is evidence that they are not entirely spasmodic, we shall have but too much reason to fear that the pseudo-membranous exudation has taken place, and some modification of the treatment will be necessary. It will be of little use to continue the depletion further, as the result will be rather loss of strength than benefit; but we may continue the calomel and the expectorants I have already mentioned. If the fits of coughing be severe and suffocative, an occasional emetic will be of service in loosening and perhaps expelling the lymph exudation. The continued use of tartar emetic must depend upon the circumstances of the case. The inhalation of aqueous or medicated vapors has been recommended by high authority, that of Hume, Pearson, Rosen, Pinel, Gölis, &c.; they ought to be merely emollient in the first stage and early part of the second, but afterwards slightly stimulant. It may be useful, also, in the spasmodic form of the disease, but must not impede the employment of antispasmodics by the mouth or in enemata. Dr. Budd, of Bristol, recommends converting the bed of the patient into a vapor bath, and giving an emetic every four hours.† A

* *Surgical Pathology of Larynx and Trachea*, p. 45.

† *Med. Times and Gazette*, June 19, 1852, p. 611.

warm bath will also be found useful occasionally, but in some cases it seems to aggravate the dyspnœa.

The use of narcotics in this stage requires great care; they should be given in small doses, and only those should be employed upon whose action we can reckon most certainly, and in the form the most uniform in its operation; for this reason they had better not be given in clysters. Dover's powder may be combined with the calomel or with camphor, or camphor with James's powder and hyoscyamus; or a drop or two of laudanum added to the expectorant mixture will probably answer the purpose best. Dr. Condie recommends a tobacco poultice to the throat, composed of the moistened leaves of tobacco, mixed with the crumbs of stale bread or ground flaxseed. The patient must be carefully watched, lest the depressing effects be excessive.

Dr. Purefoy has related a case of croup in which much benefit was derived from the iodide of potassium, after bloodletting, emetics, and blisters. He gave one grain, combined with a grain of hyd. c. cretâ, every two hours.*

M. Ozanam regards bromine as a specific in pseudo-membranous affections. He tried it in two cases of true croup, but it is not stated in what stages of the disease. He gave either bromine or bromide of potassium in doses of from one to ten grains a day.†

Mr. Hird speaks highly of the effects of alkalis in allaying spasms and promoting the absorption of the exudation; he gives ten or fifteen minims of the liq. potassæ every four hours.‡

The hydro-sulphuret of ammonia is said by Chamerlat and Condie to be beneficial in this and the next stage.

Dr. John Archer, of Maryland, strongly recommends senega root as an almost infallible remedy in cases of croup, and almost all American writers speak favorably of it. I can bear witness to its value, but it is rather as an expectorant after the first violence of the inflammation has been subdued. It may be advantageously combined with antimonials, or ipecacuanha, or squills, as in the following formula:—

R.—Decoct. senegæ, ʒij.

Oxymel. scillæ, ʒij.

Vini ipecac. ʒj, or Liq. antimon. ʒiij.—M.

Cap. cochl. i. parv. 2ndis vel 3tiis horis.

Dr. Maclean and M. Constance speak very highly of tincture of digitalis: the former gentleman tried it in one case, and the latter in two, and all recovered. It may be a useful adjunct in the first, and

* Dublin Journal, May, 1846.

† Medical Times and Gazette, June 7, 1856.

‡ Lancet, December 5, 1846.

early part of the second stage, but it would, I think, be unwise to depend upon it to the exclusion of other remedies. Should the active measures hitherto recommended cause much depression, it may be necessary to make a cautious use of stimulants or tonics.

In the *third stage*, the three latter indications of cure are to be kept in view. The expectorants must be continued, and occasionally vomiting should be excited. It is advantageous at this period to combine them with antispasmodics or stimulants, such, for instance, as camphor, musk, assafoetida, &c.; or the latter may be given in the form of enema. Inhalation of the vapor of ammonia, camphor, or ether, with aqueous vapor, has often been found useful, and occasionally the fumes of vinegar alone, or mixed with camphor. Tepid baths may be used occasionally, and if there be much collapse, a little flour of mustard should be added to them.

If we have any evidence of the expectoration of lymph, it may be promoted by emetics; and for the same purpose Seutin and Thilenius recommended sternutatories.

Blisters may be applied to the neck or sternum, and during this stage they act as stimulants as well as counter-irritants; or strong rubefacients to the throat, chest, or between the shoulders, may be employed.

Stimulants will certainly be necessary as the disease advances, and probably the best we can employ will be camphor, ammonia, or musk.

Harden, Schmidt, and Copland, speak well of cold affusion to the head by way of relieving the congestion of that organ which results from impeded respiration, and so diminishing the chance of convulsions.

The bowels should, of course, be kept free throughout each stage.

The persistence of the more active part of the treatment during the third stage is generally undesirable; it must depend upon the character of the symptoms and the strength of the patient. If the bowels be not too much affected, the calomel may be continued, and an occasional emetic exhibited; but in general we have to act more indirectly, and through the medium of the constitution, aided by counter-irritants.

Thus we see the means at our disposal which offer a probability of success are not very numerous. Early vomiting, continued nausea, bloodletting, warm baths, counter-irritants, expectorants, tartar emetic, calomel, some few antispasmodics, and stimulants, compose the whole list; but these, used judiciously, promptly, and vigorously at first, and more cautiously afterwards, afford a reasonable hope of success if we are summoned sufficiently early.

The *modifications* of croup will require nearly the same treatment. When the attack exhibits more of a *spasmodic* character, the remedies need not be quite so severe; emetics at the beginning are equally necessary; but in many cases we may dispense with bloodletting, not, however, if any of the croupy character remain. Next to emetics, counter-irritants, expectorants, antispasmodics, and cathartics will

afford the greatest relief. Dr. Copland recommends the administration of bark, and, no doubt, in the more advanced stage, when there is much sinking, it is calculated to be of use.

When croup is complicated with *bronchitis*, *pneumonia*, or *pleurisy*, the same principles of treatment will apply; but in addition, local remedies will be necessary. Fortunately, tartar emetic, calomel, counter-irritants, &c.; are as effectual in these diseases as in croup. I do not think that children so affected bear depletion to any great extent; but, with regard to this and the rest of the treatment, we must be guided by the intensity of the attack and the strength of the constitution.

Secondary croup requires a more skilful modification of treatment; it is seldom that very active means can be employed. In addition to the remedies for the primary disease (to be hereafter mentioned), we must have recourse to an occasional emetic, to small doses of tartar emetic, expectorants, counter-irritants, stimulants, topical applications, &c. I shall have an opportunity of alluding to this part of my subject in another part of this volume, when speaking of diphtherite, &c.

But we have seen that a portion, at least, of the disease consists in the mechanical impediment to the passage of air into the lungs, that this obstacle is chiefly in the larynx, and that the fatality of the disease is partly owing to the inefficient aeration of the blood in consequence. Now, it is a very natural and plausible question whether this difficulty might not be avoided by an operation; in other words, whether the operation of tracheotomy, by admitting air freely to the lungs, might not, even in the third stage, prolong life and increase the chances of cure. Accordingly, the question has occupied the attention of most writers, and led to different conclusions. It appears to have been first proposed by Home and Michaelis; and it has been practised in Spain, Denmark, Germany, America, and in Geneva, Brest, Lyons, Paris, London, Dublin, &c. I shall mention the opinions of some of the principal authorities. Dr. Cheyne is opposed to it because he thinks it would be useless unless the membrane could be removed, which, in most cases, would be impossible, and in others superfluous, on account of its rapid reproduction. He condemns also, the danger of the operation in young children.* Dr. Dewees saw the operation performed twice by Dr. Physic, under favorable circumstances, but without success; and he objects to it as being uncalled for in the earlier stages, and unavailing in the latter.† Mr. Porter has investigated the matter with his usual ability, as to the necessity of the operation, the symptoms requiring it, the period at which it ought to be performed, and the amount of success which has attended it; and, having had extensive experience of the disease, and moreover having performed the operation as a last

* Pathology of Larynx and Bronchia, p. 41.

† Diseases of Children, p. 480.

resource himself, he has arrived at the conclusion that "the operation does not afford sufficient prospect of benefit to admit of our having recourse to it."* Mr. Carmichael has recorded a case in which he performed the operation with success, and a second which was unsuccessful.† Dr. Stokes expresses his decided dissent from the performance of tracheotomy: "Experience has shown that the operation has failed in the great majority of cases; and it is obvious that, with our present knowledge of the nature of the disease, we can scarcely hope for good from its performance.‡ Dr. Stewart is evidently unfavorably disposed to the operation.§ Dr. Condie admits that in severe cases, when timely performed, it may save the life of the patient; and he mentions Drs. Hosack and Farre among those favorable to it.|| Dr. West states that it proved fatal in all cases tried in the hospital for sick children, and in ten cases under his own superintendence, in no instance was it followed by good results.¶ Dr. S. Merriman seems more favorable to it. He mentions that, "in a case which he attended along with Mr. Lightfoot, this operation was proposed as a last and only remedy; and it was performed by the late Mr. Chevalier, and was perfectly successful.** A successful case is also mentioned in the third volume of the *Medico-Chirurgical Transactions*. Dr. J. F. Meigs has seen the operation performed three times, and in two of the cases the children recovered.†† But he mentions that it has been performed in Philadelphia in eight cases prior to 1848, and in four cases during that year (exclusive of his three cases), and in all unsuccessfully. Dr. Bigger has recorded a successful case in the *Dublin Medical Press*.‡‡ Dr. Coley relates a case in which he performed the operation, and the patient died.§§ Mr. W. Craig has published a case in which he operated successfully.|||| The child was æt. 7, and the false membrane had extended below the incision, but was removed through it. Mr. Jones of Jersey relates a successful case, Oct. 5.¶¶ Dr. Fuller has related two in girls.*** Mr. Pollock

* Surgical Pathology of Larynx and Trachea, p. 57, *et. seq.*

† Trans. of Association of Physicians of Ireland, vol. iii. p. 170.

‡ Diseases of the Chest, p. 219.

§ Diseases of Children, p. 85.

|| Diseases of Children, p. 309.

¶ Lancet, Feb. 7, 1856.

** Underwood on Diseases of Children, p. 451.

†† American Journal of Med. Sciences, April, 1849, p. 307.

‡‡ Jan. 6, 1847.

§§ Brit. Record of Obst. Science, Feb. 1, 1848, p. 60.

|||| Med. Times and Gazette, May 21, 1853, p. 522.

¶¶ Med. Times and Gazette, Oct. 4, 1846.

*** Lancet, Feb. 7, 1856.

of St. George's and Mr. Edwards had a successful case, but Mr. Henry Smith's cases all proved fatal.

On the Continent, however, the operation has found some advocates, and apparently met with somewhat greater success. Caron, Marigault, Senn, Maslhieurat, Berard, Petit, Rilliet and Barthez, Barrier, Guersent, Bouchut, Thore, R. Latour, &c., are in favor of it; but it has also powerful opponents in Vieussieux, Double, Albers, Jurine, Royer Col-lard, Bricheteau, Becquerel, Bondet, &c.

M. Guersent states that he has performed the operation one hundred and fifty times since 1834; the later operations having been much more successful than the earlier ones. In 1850 he operated upon forty children in private practice, and eleven recovered; of twenty operated upon in the hospital, thirteen were successful.*

The researches of M. Bretonneau revived the operation in France and gave hopes of its being more successful. Out of fifty-five cases of different ages, he found the exudation reaching to the bronchial ramifications in six or seven; in one-third of the whole number it reached as far as the bifurcation, and in thirty or thirty-one, it terminated at different parts of the trachea, so that it was inferred that it was possible to perform the operation below the seat of the disease, and that to these cases the most formidable of the objections would not apply. M. Fouquet mentions five successful operations out of seventeen, by M. Bretonneau, and strongly advocates the operation. It was performed on the child of Dr. Scoutetten, aged three weeks, on the third day of the disease, and under very unfavorable circumstances, and it recovered.

M. Valleix found that out of a number of cases treated by medicine, about one-third recovered, and as many when the operation had been performed, and certainly, as he remarks, even one recovery is a life saved, inasmuch as the operation is generally performed under most discouraging circumstances, and as a *dernier ressort*.

Dr. Karl Weber has recorded two cases, one of which succeeded;† and Dr. Archambault has recorded two successful cases which were in the last stage.

More recently M. Trousseau has reported the result of the operation in 215 cases, of which 47 recovered, and 168 died. He is, of course, favorable to the operation, which he advises as soon as we are sure that false membranes exist in the larynx. He prefers tracheotomy to laryngo-tracheotomy, for although the latter is the more simple and the more easily performed, by the former we get more probably below the disease, and the canula is more easily tolerated; and, after all, he concludes that there is little danger from tracheotomy, as he has performed it 121 times, with only one mischance as far as

* Mém. de la Société de Chir. de Paris, vol. iii. 1852-3. Brit. and For. Rev., April, 1856.

† Henle's Zeitschrift, vol. iii. part 2, part 8.

the operation was concerned. He gives the following summary of the success of croup treated by tracheotomy. M. Bretonneau saved six out of twenty; M. Trousseau saved twenty-seven out of 112; M. Leclerc, of Tours, succeeded in two cases; M. Velpeau succeeded in two out of ten; M. Petit in three out of six. He mentions that there are also living in Paris, about fifteen children saved in croup, by tracheotomy, performed by Gerdy, Robert, Guersent, jun., Boniface, Deprès, Blandin, &c., but he is unable to communicate particulars.*

From the slight sketch I have given, the reader will perceive that the weight of authority, especially in Great Britain and America, is against the operation in croup, and also that the results of the cases in which it has been performed exhibit no very encouraging success. As an argument, this is not worth much, however, to those who regard the operation as a "dernier ressort," to be adopted in no case where there is hope from the ordinary method of treatment.

The objections to the operation are principally these:—1. That the larynx is not mechanically closed by false membrane; that in all cases, as Dr. Cheyne has remarked, there is a sufficient space for the access of air; that if the larynx be closed, it must be by spasm in addition to the exudation; and that, therefore, to attempt relief by a mechanical operation, would be superfluous, to say the least of it. 2. That it is extremely difficult to say that exudation has taken place, and still more to fix the limits of it, and pronounce in any case that it has not extended below the larynx; and yet upon this depends the utility of the operation, for, 3. If the false membranes have extended below our incision, the operation, being purely mechanical, can afford no relief, but may seriously add to the danger. 4. Bronchitis or pneumonia may exist at the time of the operation, or may very likely arise very soon after, and render it altogether useless. 5. The operation itself is not without danger, nor quite so easy as has been stated, especially with young infants. In addition to hemorrhage and escape of blood into the trachea, the patient may be attacked by prolonged syncope, asphyxia, or convulsions, as occurred in M. Trousseau's practice, and occasionally either of them may prove fatal. 6. That the risk of inflammation and other accidents after the operation is very considerable, and materially diminishes its value. 7. That the results of the operation hitherto, although successful to a considerable extent, are not sufficient to justify our having recourse to it under ordinary circumstances. "If," says Mr. Porter, "it were possible to place a host of those cases in which bronchotomy had not proved serviceable, in array against those wherein it had seemed to be useful, it would scarcely be necessary to advance any further argument in proof of its uncertainty."†

* Rilliet and Barthez, *Mal. des Enfants*, vol. i. p. 379.

† *Surgical Pathology of the Larynx and Trachea*, p. 64.

Still Mr. Porter admits, very justly, that he cannot say that there are no cases of croup in which tracheotomy would be useful and proper; the great difficulty is how to recognize them with sufficient accuracy. If it were possible to ascertain that false membranes had formed in the larynx without extending beyond it, that the lungs were free from disease, the constitution good, and no cerebral symptoms present, then, the dyspnœa being relieved, and the threatened asphyxia postponed, we might hope to gain time for the operation of other remedies; for, as Trousseau remarks, tracheotomy is not a cure, but a means of gaining time for a cure. Mr. Porter has himself mentioned a case in which it might be employed: "But if the infant is, to all appearance, dead, and the practitioner is called to him within any reasonable time, he should then, with the least possible delay, endeavour to inflate the lungs and restore animation by whatever means shall appear to be the speediest, and of these, perhaps the most preferable will be laryngotomy."

This being the case, I shall mention a few of the peculiarities in the mode of performing the operation suggested by MM. Bretonneau and Trousseau. The trachea should be laid open freely, and as quickly as possible; if we can avoid cutting through the veins it is desirable, but if we cannot, it is unnecessary to apply a ligature, as the bleeding will stop the moment the canula is introduced. Much time is thus saved, and we escape the chances of phlebitis. When the trachea is opened, a dilator is to be introduced into the wound, the child placed upright, and time allowed for the establishment of respiration and the arrest of the hemorrhage; or a portion of one or two of the rings of the trachea may be removed, which will render a canula unnecessary according to Mr. Lawrence's suggestion, or we may use the scissors and dilator proposed by Dr. Marshall Hall, by which the operation can be most rapidly and effectually performed, with less danger of hemorrhage, and without the necessity of cutting through the cartilages. If the child is in a state of asphyxia or syncope, cold water should be dashed in its face, and a feather introduced into the trachea, so as to excite inspiratory action. In case of orthopnœa, a few drops of water may be thrown into the trachea, and that tube cleared of blood and false membrane by means of a small sponge fixed upon a slender stem of whalebone. Generally speaking, the child will itself reject the blood or loose fluid matters which may be in the trachea, but it will require several light spongings to get rid of the false membranes. M. Trousseau prefers the large curved canula of M. Bretonneau, or the bivalve canula of M. Gendrin. It is necessary to have it sufficiently long to allow for the subsequent swelling of the parts, and wide enough to allow for the expulsion of mucus. The canula should be withdrawn and cleansed whenever the air does not pass freely through it. At first the dilator will be necessary for its introduction, afterwards the wound remains open, and the replacement is easy. After the fourth or fifth day, if the case be going on favorably, we may allow the attempt to breathe through the larynx, as "an essential principle of tracheotomy is to withdraw the canula as soon as possi-

ble;" and when the patient has been gradually accustomed to natural respiration, and it is performed with facility, the canula may be altogether withdrawn, and the wound closed.

But the operation is only a part of the treatment, merely for the relief of the asphyxia, and will probably fail unless topical remedies be applied. Those recommended by Trousseau and Bretonneau are a strong solution of nitrate of silver applied with the sponge to the larynx, and a few drops of a much weaker solution injected into the trachea, four times the first day, three times the second and third, and once or twice the fourth day, followed by a little warm water. A few drops of water may be thrown into the trachea, once or twice every hour, and if the breathing be embarrassed by mucus, the sponge must be lightly used after the injection of water.

I shall conclude this account of the operation from M. Trousseau by quoting his propositions relative to the prognosis:—" 1. If the commencement of the attack date several days back, if, consequently, the disease have advanced slowly, whatever may be the extent of the false membranes in the trachea or bronchi, the child will either recover, or, at any rate, live several days. 2. But if the disease have been rapid, even though we ascertain, at the moment of the operation, that the false membranes do not extend beyond the larynx, the patients die quickly. 3. If, before the operation, the false membranes have invaded the nose, if they cover the surface of a blister, if the child be pale and somewhat puffed, without having taken mercury or been bled, or if it have lost much blood, there is little chance of success from the operation. 4. If, before the operation, the pulse is moderately frequent, and if afterwards it is calm, we may hope. 5. If, immediately after the operation, respiration become very rapid, and the child cough but little or not at all, it is a bad sign. 6. More boys than girls are cured. 7. Children under two and above six years are easily cured. 8. *Cæteris paribus*, the danger is in proportion to the extent of the false membranes. 9. If the child have been subject to chronic catarrh, and if it had been suffering from cold some time before being attacked by croup, tracheotomy will be likely to succeed. 10. Even when the progress is favorable, very rapid respiration is a bad sign. 11. The more rapid and more energetic the inflammation which attacks the wound, the better are the chances of cure; a sudden sinking in of the wound is a fatal sign. 12. There is nothing to fear so long as the respiration is noiseless, or when the sound is produced by the disturbance of the mucus; but if the respiratory sound resembles the noise of a saw cutting a stone, death is certain. 13. If pneumonia or pleurisy supervene, it is no ground for despairing of the patient. 14. Agitation and sleeplessness are bad signs. 15. If the wound be covered with false membranes; if, after the removal of the canula, it remains a long time gaping; if, when almost cicatrized, it reopens freely; we may conclude that the child is in danger. 16. The sooner the larynx becomes free after the operation, the sooner we can dispense with the canula, the

more certain and rapid will be the cure. 17. If croup have supervened upon measles, scarlatina, smallpox, or whooping-cough, although there is ordinarily no connection between those diseases and croup, tracheotomy will not succeed. 18. If, on the third day after the operation, the expectoration become mucous and catarrhal, the infant will recover; if, on the contrary, there is none, or it is serous, or like half-dried mucilage, the child will die. 19. If the patients react violently against the injections of water or the sponging, we must not lose hope, how bad soever the other symptoms may be. 20. Children attacked by convulsions die, and they are the more liable to them in proportion to their youth, and to the quantity of blood lost before, or during the operation. 21. When, after the tenth day, the drink passes from the pharynx into the larynx and trachea, even though easily rejected, the patients most frequently die. 22. Increase of the fever after the fourth day, agitation, collapse of the wound, and dryness of the trachea, rapidity of respiration, and frequency of cough, announce the commencement of pneumonia, which, at first lobular, becomes pseudo-lobular, and must be treated by the usual means, with the exception of blisters, which are apt to be covered with the false membranes."*

During the attack of croup the diet should be strictly antiphlogistic, but when the child shows indications of exhaustion, we may give light nourishing food, in any form of the disease.

Cold water, whey, barley-water, &c., are pleasant drinks, and should be given quite cold. The temperature of the room should be moderate and agreeable, the air kept pure and fresh, and the bedclothes light yet warm.

In favorable cases, when the child is convalescent, the clothing must be carefully arranged, to secure against cold. I should recommend that a light, thin flannel waistcoat be worn for some months. The child should go out only during the warm parts of the day, and carefully avoid damp or cold: during the prevalence of east winds it had better remain in the house.

Prophylactic Treatment.—When croup appears among the children of a family, our attention should be directed to those not attacked, in order to anticipate and prevent such a seizure; and a patient recovering from the disease must be watched subsequently with more than ordinary care. All predisposing and exciting causes should be removed or neutralised, if possible. If the climate or locality be unfavorable, the children should be removed, at least for a time, and if that be impossible, other suitable precautions must be taken. Flannel should be worn to guard against vicissitudes of temperature or cold winds. The cold or shower bath may be used, followed by smart friction, so as

* Rilliet et Barthez, *Mal. des Enfants*, vol. i. p. 389.

to insure reaction. The bowels should be kept free, and the slightest cough or cold attended to.

If an attack be threatened, an emetic, followed by expectorants, warm baths, purgatives, and counter-irritation, should be instantly given.

CHAPTER V.

ATELECTASIS PULMONUM.

THIS term has been given to a condition of the lungs, or a portion of them, which is of comparatively recent observation, and the precise pathological value of which is far from being settled as yet.

We may take as the type of this condition, the lungs of a fœtus who has not breathed, although the extent varies very much, and according to the extent so do the symptoms. This state, to which the names atelectasis, atelectasia, apneumatosi, etat fœtal, &c., have been given, may be observed immediately after birth, or at a later period; the former is evidently congenital, the latter acquired. I feel no doubt as to the occurrence of such an acquired disease, any more than of its being also congenital, although I may not quite agree with the interpretation that has been given of it.

I. Let us first examine into the form of the disease as we see it in infants of a few days old, as it has been described by MM. Jörg,* Hasse,† &c., and thus we shall be better prepared to appreciate it in other children.

Symptoms.—We find the atelectasis of new-born infants characterized by a feeble and incomplete respiration, which is occasionally intermitting. Instead of the loud hearty cry, the child wails weakly and complainingly from want of breath. It seems to have great difficulty in sucking, and if the chest be stripped so as to be observed naked, it has scarcely the usual rounded appearance, and its movements are limited, or apparently inverted, the sides of the chest being flattened rather than expanded. The surface is cold and more or less livid

* Die Fœtuslunge in neubornen kinder.

† Pathological Anatomy, p. 249. Sydenham Society.

from the imperfect aeration of the blood ; the pulse is weak and languid. If the amount of impermeable lung be not so great as to be inconsistent with a prolongation of life, it is sure to influence and impair the nutrition, the infant becomes weak, delicate and emaciated. Dr. Rees mentions that such patients are obnoxious to attacks of laryngismus stridulus, by one of which the infant is frequently carried off.

When the atelectasis is of moderate extent, it may terminate in partial or complete recovery, but when at all extensive it usually ends fatally. In some cases when great efforts are required for respiration, Jöerg states that congestion or inflammation of the lungs may be produced : in this, however, Hasse differs from him, and considers that inflammation is neither necessary nor even frequently the consequence of atelectasis, for that the part of the lung in this condition is passive to other morbid processes, especially to inflammation, as he has seen these parts remain unaltered in the midst of surrounding hepatization. From recent researches, we have reason to believe that this state of the lungs has an important relation to œdema of the cellular tissue, of which I shall speak hereafter.

Now the state of the lungs which gives rise to these symptoms is simply that a portion of them remains in the condition in which it was before birth, undilated and impervious to air. Medico-legal researches have shown long ago, that the entire foetal lung is not at once inflated, but the small portion thus temporarily impervious gradually diminishes, and does not interfere with the well-being of the infant. If, however, a larger portion be undilated and remain permanently so, then we have the disease in question produced.

That portion of the lung in a state of atelectasis, seldom so much as an entire lobe, appears condensed ; it is depressed below the level of the neighbouring or surrounding parts, of a dark red or violet color, without crepitation, and when divided by the knife, no air can be expressed. The cut surface is red and smooth, from which, when squeezed, a slightly sanguineous serum without air bubbles exudes, and the affected part sinks absolutely in water. The tissue feels rather harder than other parts, but less tenacious. "The diseased patches," says Hasse, "display a brown red, or rather a bluish red color, which is more intense if the whole lobule is uniformly unexpanded, in which case it is marked off by a sharp contour from the surrounding pale-red healthy substance. When, on the other hand, scattered cells within such a lobule become inflated, the violet color is interrupted here and there, and passes by a gradual transition, and without any distinct boundary, into the natural shade.* The inferior and posterior portions of either or both lungs may be affected, but most frequently those of the right lung. When atelectatic infants die a day or two after birth, it is generally possible to dilate artificially the undeveloped part. The depressed lobule is then seen to

* Pathological Anatomy, p. 249.

rise gradually to the level of the rest, and to assume the color, permeability, and the characters of sound lung, but this does not appear to be always possible when it has remained for weeks or months in a state of atelectasis. In infants dying from this disease, both Jöerg and Hasse found the foramen ovale invariably open.

So far then as our investigations have as yet gone, it would appear that this state of the lung in new-born infants, is not the result of inflammation; that it is not necessarily connected in any way with inflammatory action in the lungs; nay, that it is not, properly speaking, a disease at all, but merely an arrest of physiological development; there is nothing new or morbid in this part of the lung, but merely the persistence of the old intra-uterine condition.

Causes.—There is great obscurity upon the causes of this affection; in many cases we cannot account for it at all; in others, it may perhaps be owing to defective nervous energy, in consequence of compression of the head during its passage through the pelvis, inducing a degree of asphyxia.

Treatment.—It is not improbable that this condition may be prevented if we are careful to induce full inspiration when the child is born, so as to establish respiration completely before the funis is divided. The impression of cold, and the unceremonious handling, washing, &c., generally achieve this, but we ought to see that it is secured; and if we find the respiration feeble, and the cry unusually weak, the mouth being clear of mucus, the infant should be stimulated by slight taps, sprinkling of cold water, frictions to the back, warm baths, &c., until we are satisfied with the action of the lungs, or that these remedies have failed altogether. Jöerg recommends repeated enemata and emetics; the former can do no harm, and may do good, but I should fear a frequent repetition of the former. A warm equable temperature is necessary, and the infant should not be clothed less warmly than usual, and at the time of dressing and undressing, the back and chest should be well rubbed with the warm hand.

II. *The acquired form of atelectasis* is characterized by a dry barking cough, very distressing, which may continue for a considerable time, and recur after an uncertain interval of rest; it is generally worse at night than in the daytime. There is also a certain amount of dyspnœa varying according to the extent of the solidified portion of the lungs, and it possesses this peculiarity according to Dr. Rees, that it is shown "first in the rapidity, and secondly, in the unequal lengths of the inspiratory and expiratory efforts, the former being much the longer; moreover, owing to the persistence of the difficulty, it becomes habitual to the child, so that you find it cheerful, and taking notice, when the quickness of breathing is to the observer really distressing, and would be taken by any one unacquainted with the nature of the case to denote active inflammation.* The action of the heart is naturally much

* Atelectasis Pulmonum, p. 8.

increased both in frequency and force, so as after some time to indicate that enlargement has taken place, and this violent action is occasionally accompanied by hemorrhage from the nose, rectum, &c., which appears to afford temporary relief.

But the most striking symptom of all is the altered movement of the ribs in respiration, which resembles the peculiar motion which every one must have observed in an infant at birth before respiration is completely established, viz: during inspiration the ribs laterally are drawn rather inwards and backwards towards the mesial line, protruding the sternum slightly; instead of distending outwards, as in ordinary inspiration, the result of which is rather a diminution than an increase in the cavity of the chest. This, which can only be detected when the chest is uncovered, will serve to impress upon my junior readers the necessity of a thorough and minute examination of the chest of infants and children whenever the lungs appear to be affected. If the atelectasis be extensive, of course there will be dulness on percussion over the diseased portion, and a deficiency of respiratory murmur, with perhaps bronchial respiration.

As in new-born infants in whom this state continues long, we find the power of nutrition greatly impaired, the child becomes emaciated, but not so much so as in the former class of cases according to Dr. Rees, and it is seen chiefly in the limbs, the abdomen always becoming tumefied. The skin acquires a dusky color, owing probably to the impediment offered to the return of the blood and its imperfect oxygenation. The general symptoms of inflammation of the lungs are entirely absent.

Lastly, Dr. Rees has stated a result of long continued atelectasis, which appears to me to require somewhat more evidence than we have at present. He believes that in adaptation to the state of the lungs the form of the chest becomes gradually changed. "The direction of the deformity will depend upon the original constitution of the patient. If a strumous diathesis be present, strumous or rickety malformation of the chest will result. The bones themselves will yield beneath the arms, where a hollow will occur, narrowing the cavity in that direction, while the front projects unnaturally forwards. The common form of rickety chest is, I believe, usually the consequence of atelectasis of the lung, and this explains a difference not readily accounted for; namely, why in one case, with considerable rickety deformity of the extremities, there is a fully expanded and well-formed chest, while in another, with the limbs straight, the altered state of the chest is so considerable; it is because in the latter case the lungs have previously become shrunken, owing to a vitiated atmosphere or other depressing cause, atelectasis of the lungs has taken place, and the walls of the chest are forced inwards to the state of the respiratory organs."*

* Atelectasis Pulmonum, p. 11.

Now, without denying that this may be the case in some instances, I cannot think that it is the ordinary way in which pigeon breast is produced. If a collapsed state of the lung alone involved such an adaptation of the ribs, we should surely see it, as Dr. Corrigan suggested to me, in pleuritis, in which the chest contracts but the deformity in question is not produced. We can understand, however, that if a rickety disposition of the bones of the ribs exist, together with atelectasis, that the atmospheric pressure externally not being counteracted by expansion of the lung, the result of these two conditions may be the flattening of the ribs, and protrusion of the sternum; or, the pressure of the atmosphere alone with the ribs in this condition may, and often does, produce this deformity, as Dr. Corrigan has shown.*

Pathology.—The condition of the affected portion of the lung does not differ materially from that which I have already described. It is of denser texture, of a dark color, and depressed somewhat below the level of the neighbouring parts. The pleura, according to Friedleben, is somewhat thickened, and can be peeled off the affected parts. But the most important fact is that by inflation those parts can be raised to the level and made to assume the appearance of the healthy lung.

The deformity of the chest will be apparent, if it exist, as well as the tumid abdomen, with the enlarged venous trunks both external and internal.

The heart is generally hypertrophied, but chiefly the cavities of the right side, if the disease has existed for some time.

So much for the *post-mortem* appearances. There are, however, two important pathological questions, about one of which a good deal has been written latterly, but which can hardly be answered satisfactorily at present, upon which I must say a few words.

1. Is atelectasis ever an acquired disease, or is it merely that the foetal condition of the lung has remained unchanged from birth until the age at which it is discovered?

Friedleben takes the latter view, and whatever he writes is entitled to respect. He founds his opinion upon the anatomical characters, which undoubtedly resemble as closely as possible the foetal lung,† and upon the physiological impossibility that the lung could lose its power of expansion without mechanical cause; but this appears to me a "*petitio principii*," the supposition being that it does so; and, surely, if probabilities are to have any weight, it is at least as unlikely that a portion of the lung not affected by disease or mechanical impediment, should remain for years after birth unchanged.

The great authority of Dr. West is decidedly in favor of atelectasis occurring at a period subsequent to birth, "so that lungs once permeable to air may cease to admit it, and death at length occur from

* Lecture, Dublin Hospital Gazette, April 1, 1845, p. 47.

† Archiv. für Physiolog. Heilkunde, 1847.

apnoea, without any serious structural change having taken place in the organs of respiration." Dr. G. A. Rees, in his pamphlet, has given seven cases in which he detected it in children from two months to two years old, and he entertains no doubt of its being an acquired disease. If I had any doubt in my own mind, the experience and observations of Drs. Baly and Gairdner* would have removed it, as they have recorded a precisely similar condition, the effect of disease, in adults of various ages.

2. Is atelectasis identical with that disease which has been described as lobular pneumonia, or with the carnification which we meet with in lungs affected by pneumonia?

In the chapter on pneumonia, I have shown that this is pretty much the view taken by both Legendre and Bailly, founded mainly upon the fact that in some, but by no means in all cases, they succeeded in inflating the lobules. This opinion has been still further carried out by M. Fuchs. Dr. West conceives that most if not all the cases of so called lobular pneumonia, and especially of that stage which has been termed carnification, were, in truth, examples of atelectasis produced by an occlusion of the pulmonary vesicles. "Nothing," he says, "can show more forcibly the influence of a name than the fact that this condition of the lungs should have been described by all writers as lobular pneumonia, and that its symptoms should have been attributed to inflammation, while yet it was evident from the concurrent testimony of every one that neither in its progress nor in its results was it similar to inflammation in the adult, much less identical with it."†

An attentive consideration of the arguments and evidence adduced, whilst it has satisfied me that atelectasis has frequently been mistaken for lobular pneumonia, has not, I must confess, convinced me that the two conditions are identical. As yet, I am not prepared to deny the distinct existence of lobular pneumonia, any more than that of atelectasis, unless more extended observation shall afford a greater mass of evidence than we at present possess. This seems to be as nearly as possible the opinion of M. Hasse, who thus draws the distinction between the *post-mortem* appearances of atelectasis and pneumonia. "In atelectasis, the coloring of the diseased portions of lung always approaches more to a violet, their exterior appearing smooth and glistening, so as to contrast with the dull brown red surface of inflammation. In inflammation, again, the diseased portions are preternaturally distended, whilst in atelectasis they are collapsed, and inferior even to the healthy texture in volume, but susceptible, provided the disease has not lasted too long, of artificial inflation, and capable through its means of acquiring a perfectly natural appearance. In inflamma-

* Edinburgh Monthly Journal, Nov. 1850.

† Diseases of Infancy and Childhood, p. 159.

tion the pulmonary texture is softened; in atelectasis it is hard, and the cut surface is not granular, but smooth. Where no complication exists, the anatomical characters of a first or third stage of pneumonia are not discoverable in or near the diseased patch: in short, we have nothing like pneumonia except the solid non-crepitant mass which has been confounded with the second stage of that disease, viz: with red hepatization.* He adds that "unequivocal cases of infantile pneumonia, whether lobar or lobular, such as I have myself examined, and such as Kiwisch has published, afford, on the other hand, the strongest negative grounds for establishing atelectasis as a distinct form."

From the evidence adduced, I think I may draw the following conclusions:—

1. That in certain new-born infants a portion or portions of the lung remain undilated or impermeable to air, and that these give rise to certain symptoms and signs, and involve certain consequences already enumerated. That the anatomical characteristics of these portions of the lungs are their being solid, free from air, of less proportionate bulk, capable of being inflated, and after inflation of assuming their natural character.

2. That a similar disease may be acquired during childhood, presenting analogous signs and similar anatomical characters.

3. That this condition may be, and probably has often been mistaken for lobular pneumonia, especially in young infants. That pathological condition which has been termed "carnification," has certainly a very close resemblance to the condition of the lung in atelectasis, and I should not be prepared to deny that many such cases may really be examples of the latter disease.

4. But I cannot at present agree with the opinion that all which has been regarded as lobular pneumonia, is really but atelectasis superinduced by a vascular congestion, closing the air-cells, or by an obstruction in the air-tubes.

5. It does not seem impossible that this disease, although distinct from pneumonia, may result from it, or from an attack of bronchitis, as Dr. Rees believes, and as Dr. Gairdner's researches have proved in the case of adults.

Diagnosis.—The most important diagnostic sign of atelectasis is the altered movements of the ribs, which only occurs in one other disease, viz. occasionally in croup. In the latter disease it has been noted by Drs. Rees and Sibson, but the accompanying symptoms are too marked for any one to confound the two diseases. Dulness on percussion, with the absence of either respiratory murmur or crepitation, may perhaps enable us to distinguish it from pneumonia, but there may be doubtful cases. The progressive emaciation accompanied by the pul-

* Pathological Anatomy, p. 252.

monary symptoms may excite suspicions of phthisis, but a careful examination will generally lead us to a correct conclusion.

Prognosis.—If timely measures be adopted, this disease is curable, and even when they are neglected or fail, if the child survive for a time, the constitution becomes familiarized to the state of the lungs, and certain adaptations occur which allow of the child growing and thriving. In other cases, however, the secondary effects are more serious, the child becomes more and more emaciated and reduced in strength, the cough is very distressing, and he dies at length of exhaustion.

Treatment.—Very active treatment is evidently quite unsuitable to these cases, and so far as we yet know, the number of remedial agents is but small. The first object should be to place the child in suitable hygienic circumstances; to secure a plentiful supply of pure air, warm clothing and suitable food, as to a deficiency in these requisites we may frequently trace the origin of the disease. The diet should be good, but not excessive in quantity; meat once a-day, with milk or very weak tea, but neither vegetables, fruit, nor pastry, on account of the disordered state of the digestive organs, as evidenced by the tumid belly.

Emetics seem occasionally to be of use as well as stimulating expectorants, such as the decoction of senega with ammonia.

A very principal part of the treatment must be directed to the skin and kidneys. Dr. Rees prefers a combination of ipecacuanha with nitre, hyoseyamus, and sulphate of magnesia, so as to act as a gentle purgative, as well as a diuretic. A mild mercurial, the hyd. c. creta, for instance, may be given occasionally, alone or in combination with a purgative, as the bowels are generally confined. External irritation, by rubefacients or blisters, may be tried, and it appears to me probable, that electro-galvanism might be of use, but I am not aware of its having been tried.

In accordance with his views, as to the production of deformity, Dr. G. R. Rees insists upon the patient observing a recumbent position, lying on its back on a firm unyielding surface: "The position seems to antagonize, to the small extent we are able, the altered movement, and by keeping the spine supported and extended, renders more tardy the projection of the column, thus giving the best chance for the extended lung again to expand."

CHAPTER VI.

BRONCHITIS.

BRONCHITIS, or bronchial catarrh, is the term applied to inflammation of the mucous membrane of the bronchial tubes, accompanied with increased secretion; and those two elements, the inflammation and the secretion, not being necessarily in exact proportion to each other, has led writers to regard the disease either as a simple inflammation or as a catarrh, according to the predominance of either, and occasioned their estimating the disease as more simple than it is in fact. Following the example of M. Barrier, I shall use either term to express the disease, without limiting my meaning to the strict pathological definition of either. In one form or other, it is undoubtedly one of the most frequent diseases of infancy and childhood. From the moment of birth, indeed, to extreme old age, none are altogether exempt from its attacks; but it is at the extremes of life that it is more severely felt, and more serious in its consequences.

Bronchitis may be primary or secondary, simple or complicated, general or partial, acute or chronic, and these circumstances will require serious consideration in our estimate of the disease, and in determining the treatment. Let us first speak of primary bronchitis, which I shall divide into acute and chronic; and afterwards of secondary pulmonary catarrh.

I. *Acute Bronchitis*.—The ordinary form of acute bronchitis commences generally with a chilliness over the whole body; the child complains of cold, and objects to quit the fire; this is followed by more or less feverishness. There is a certain amount of cough from the commencement; sometimes it is slight, at others severe, very rarely in paroxysms; it may be moist or dry, but it is rarely a hoarse cough. At first the child seems to suffer pain from the cough, and, if old enough, complains of soreness on coughing, which disappears as the disease advances. In the commencement there is no secretion of mucus, which gives a hard character to the cough, but in a day or two there is a more or less profuse secretion, which, whilst it relieves the distress in one respect, may increase it in another by impeding respiration, especially with young infants. The breathing is generally accelerated, but the amount varies according to the intensity of the disease. So long as the attack is confined to the larger bronchial tubes, and if the child be tolerably healthy, the respiration is not much hurried; it ranges from 28 to 40 per minute, nor is there much increase of respiratory effort; but when the smaller tubes are invaded, it is both

accelerated and impeded, requiring rapid and energetic muscular effort. When the mucous secretion is established, and in proportion to its abundance, there is a wheezing and rattling in the chest very audible at some distance.

In proportion to the cough and disturbance of the respiration will, in general, be the state of the pulse. In slight and partial attacks it may be but little quickened, but when the disease is general, and the respiration much embarrassed, the pulse will be found very rapid, and the fever considerable. The countenance generally expresses distress; at the beginning it is flushed, but in a more advanced stage, and in proportion to the impediment to respiration, it acquires a bluish tinge, as the consequence of the imperfect aeration of the blood.

The physical signs are simple and easily recognized. On percussion, the chest yields a clear sound, if the disease be uncomplicated; but in severe cases we find here and there a certain amount of dulness, which is probably owing to a partial complication with pneumonia. If the ear or the stethoscope be applied to the chest, we shall find the sonorous, mucous, or sibilant râles pretty general, the former especially before the mucous is freely secreted, the latter afterwards. Sometimes the respiratory murmur is completely and permanently masked by them; in other cases they are more partial and temporary, and we can still hear the rapid respiratory murmur. In a few cases there is here and there a moist sub-crepitant râle audible. When the attack is slight, the appetite will be but little impaired, digestion will take place satisfactorily, and the bowels continue regular; but when the fever is considerable, the appetite is lost, there is occasionally vomiting brought on by the cough, and the bowels will be more or less disturbed.

Thus, as characteristic of the attack, we have cough, hurried respiration, perhaps dyspnoea, mucous secretion, and fever; and these symptoms generally continue stationary for a few days; then, in favorable cases, the fever gradually subsides, the respiration becomes more tranquil, the cough softer and less distressing, and by degrees the child becomes convalescent in the course of a week or two. This, however, must be considered a favorable case; in many instances, the disease, instead of diminishing, assumes a more aggravated form; it may either be complicated with pneumonia, or, extending to the capillary tubes, it may assume the characters of suffocative catarrh, which I shall describe immediately. In either case the cough becomes more troublesome, the respiration more hurried, the fever more intense, and the general distress and constitutional disturbance more severe. Auscultation will generally reveal the form which the disease has assumed, and, as we might expect, the general symptoms will also indicate the altered character of the disease. The result is much more doubtful than in the first cases; they generally recover, but when thus aggravated, if the child is much reduced already, and the attack very severe, the case may terminate unfavorably.

The other modification of acute bronchitis to which I have alluded, and which has been called *suffocative catarrh*, *capillary bronchitis*, *catarrhal fever*, is a more severe and more dangerous form of disease. It is not so common as the other forms of bronchitis; Rilliet and Barthez met with but six cases of it as a primary affection, and three as a secondary. However, in certain epidemics of bronchitis it is much more frequent, as I have observed latterly in this city. As I have already mentioned, it may grow out of or be grafted upon the former slighter catarrh, or it may assume from the commencement its peculiar characteristics. In most cases, the general symptoms precede the local, or at least their greater severity occasions them to occupy most of our attention. The fever is intense; the pulse rapid and full; the skin is hot and dry, with occasional chills; the face is flushed; there is great thirst; the tongue is white and coated, and there is no appetite. The respiration becomes rapid, not exactly difficult at first, but hurried; it afterwards becomes difficult, with wheezing, and requiring great muscular effort. The cough, which either did not exist at first, or was too slight to attract much notice, is now developed or increased, for some time dry, and occurring in a kind of paroxysm or kink; it causes great distress, and greatly increases the soreness or pain in the chest of which the child complains. At first there is no expectoration; then we have a whitish or yellowish mucus, sometimes muco-puriform in its character, and very rarely, with portions of lymph. The physical signs do not differ much from those in the ordinary and slighter forms of disease. The chest is generally clear on percussion, with the exception, perhaps, of some spots of small extent towards the base of the lungs. The respiratory murmur is entirely masked by the sibilant and mucous râles, which are heard over the whole lung, mixed, in some parts, with a moist crepitus. The wheezing is audible at some distance from the patient.

These symptoms may all be observed very soon after the commencement of the disease, and every hour they seem to increase. The respiration becomes more hurried and embarrassed, and at length unequal, irregular, and panting, with great oppression, and strong muscular efforts, great heaving of the chest, and rapid action of the *alæ nasi*. The face is pale or livid, especially after coughing, the lips purple, and the expression of the countenance that of intense anxiety and distress. The patient lies on his back, or requires to be raised into a sitting posture, according to the amount of distress in breathing. The mucous râles in the chest increase according to the abundance of the mucus secreted, which is occasionally so excessive as to threaten suffocation. The pulse becomes quicker, but smaller, weaker, and unequal, sometimes, towards the end, irregular. If the disease be not quickly terminated, we may sometimes observe occasional remissions, followed by a return of all the symptoms. In unfavorable cases, the disease rapidly gains ground, the symptoms become aggravated, the cough most distressing and painful, the respiration amazingly rapid and difficult, the

pulse very quick, irregular, and almost imperceptible, the features changed, and expressive of agony, the face livid, and covered with profuse perspiration, and at length a kind of convulsive agitation or stupor terminates in death.

I have remarked that in children of three years old and upwards, the disease may terminate in pneumonia, but in young infants more frequently in profuse fluid effusion, into the bronchial tubes and cells, producing asphyxia. "In some cases," Dr. Watson observes, "in young patients in whom bronchitis is idiopathic, and not engrafted on any other disease of the chest, in whom the disorder had not appeared severe, extreme difficulty of breathing will sometimes most unexpectedly arise, and rapidly terminate in the extinction of life. This is attributed to the permanent obstruction or plugging up of one of the bronchi. The slightest attack of bronchitis may, in this way, be suddenly transformed into a most serious and quickly fatal malady."

The course of the disease is often very rapid. Rilliet and Barthez knew it terminate in three days. M. Fauvel found the duration of the confirmed attack from six to eight days, although it may last much longer, even twenty or thirty days. But the attack does not always prove fatal; under judicious treatment, at an earlier period, the disease may be checked, the fever then gradually diminishes, the dyspnoea and hurried breathing becomes calmer by degrees, the cough less frequent and distressing, and the child slowly recovers.

The description I have just given is that of ordinary suffocative catarrh, but in practice we find considerable modifications. Dr. Parrish, of Philadelphia, has described one which is worth noticing: * "This modification of the disease commences with a cough, and the breathing soon becomes laborious and wheezing; the face is very pale, and the whole surface cold, though generally soft and moist. The countenance acquires a peculiar expression of distress and anxiety, and in some cases the cheeks become very cold, even when the other parts of the surface are of a natural temperature. The stomach and bowels are generally inactive, and the urine is small in quantity, but, so far as I have observed, of a natural and healthy color. After the disease has continued for some time, a cold perspiration breaks out on the face and neck. The cough is at first dry, attended with a wheezing sound in the chest, but towards the termination of the complaint it frequently becomes hurried and rattling. The pulse, in violent cases, becomes very small and rapid, and the tendency to sinking is, in all instances, very obvious. There is constantly much difficulty of breathing, but at times the oppression becomes so great as to resemble a violent attack of asthma. Occasionally considerable remissions occur for a short period, during which the pulse will become fuller and slower, and the countenance brighter and more calm. When the disease is

* North. Amer. Med. and Surg. Journ., vol. i. p. 242.

tending to a fatal termination, the patient becomes drowsy, insensible, and comatose, and death takes place by suffocation in a paroxysm of convulsions."

Dr. Eberle has described an epidemic which occurred in the eastern states of America in 1824, which he calls catarrhal fever, and which has very much the appearance of modified capillary bronchitis. "The disease began with a slight feeling of distress, and with a distinctly formed chill. The hands and feet become cold, the whole surface of the body pale and contracted, and the patient appears languid and drowsy. This state of depression frequently continues for a whole day before the febrile action is fully developed. In many instances, however, the fever supervenes in a very short time after the first feeling of indisposition. The patient complains of aching pains in the extremities and back, the pulse becomes frequent, somewhat tense, and generally full, the cheeks flushed, the eyes suffused with tears, and a thin transparent fluid usually issues from the nose, attended, at the commencement, with frequent sneezing. The skin is dry and husky, though seldom much above the natural temperature. The bowels are torpid, and the urine scanty and high colored; and in many instances the alvine evacuations, during the first few days, manifest a deficiency of secretion, and sometimes an entire absence of bile. In some cases cough, with slight hoarseness, is one of the earliest symptoms; more frequently, however, the cough does not come on until the fever is fully developed, and often not until the disease has continued for two or three days. The breathing is not often much oppressed in the earlier periods of the disease, though frequently attended with a considerable rattling in the trachea. In severe cases, however, respiration is frequently difficult and wheezing, almost as soon as the fever is developed, owing to the abundant secretion of mucus into the air cells. This is most apt to be the case in infants, who, from not making any efforts to free the lungs by expectoration, suffer the bronchial secretions to accumulate in the air-passages." "In the ordinary form and course of the disease the expectoration becomes very abundant after the fever has continued for three or four days; and as a copious secretion of mucus keeps up a constant irritation of the bronchia, the cough usually becomes very frequent as the disease advances."*

The most marked distinction between the symptoms of ordinary bronchitis and the suffocative catarrh or capillary bronchitis, consists in the greater amount of fever in the latter cases, the occurrence of depression, almost amounting to collapse, the hurried, wheezing, and difficult respiration, the cough being more frequent and occurring in paroxysms or fits, and the more imperfect aeration of blood, evidenced by the tumid and livid features, cold, pallid surface, &c.

II. *Chronic Bronchitis*.—The chronic bronchitis of infants and chil-

* Diseases of Children, p. 318.

dren is generally the sequence of an acute attack of the ordinary disease, or of suffocative catarrh, the symptoms of which lose their acuteness, and in a great measure their severity. There is little or no fever during the day. The cough is soft, moist, and seldom occurs in kinks; it is still distressing, however, and in some cases particularly so at night, or when lying down. The respiration is natural, with occasional paroxysms of dyspnoea. On applying the stethoscope, we find mucous râles mixed with a loud sound, as in dilated bronchial tubes, and the chest is clear on percussion. The pulse is quick, weak, and small, with some exacerbation in the evening, and occasional night-sweats. Considerable emaciation, also, is the result of the attack. The face is pale, and the eyes hollow; the lips are bluish and sometimes cracked or ulcerated; the edges of the nares are also sore, and kept so by the child picking them. The strength is very much diminished, the appetite deteriorated or lost, and in bad cases there is colliquative diarrhoea.

The aspect of cases so severe as these is really that of phthisis, and in fact they may run on into that disease. MM. Rilliet and Barthez observe that "chronic bronchitis, stimulating phthisis, may present itself under a still more unusual form, and last longer. The disease is then accompanied with fits of suffocation, followed by the rejection, sometimes, of a large quantity of pus, sometimes of tubes apparently pseudo-membranous, with the general symptoms already mentioned. Thus, in a case communicated to us by M. Legendre, the child, who was seven years and a half old, commenced, at the age of three and a half or four years, to reject, after fits of coughing, a considerable quantity of matter two or three times a day. There was constantly difficulty of breathing, fever in the evening, and night sweats. There was dulness on the left side posteriorly, and in that spot cavernous respiration, with mucous râles. The child had all the characters of phthisis. The fever increased, and the emaciative diarrhoea came on; then gangrene of the mouth, which, added to the other disease, ended in death. The disease lasted nearly four years. It was ascertained by a *post-mortem* examination that the child had suffered from chronic bronchitis, with considerable dilatation of the bronchial tubes."*

The disease ordinarily lasts from thirty to forty days and may then terminate fatally; or, under the influence of judicious treatment, the disease may yield, the symptoms diminish, and the child regain its health gradually.

Pathology.—There is some difficulty in ascertaining the presence of inflammation in the smaller bronchial tubes, because their mucous membrane, being very thin, shows the color of the subjacent tissue; and because, as M. Fauvel observes, the mucous membrane has this resemblance to serous membrane, that the redness disappears immediately after death.

* Mal. des Enfants, vol. i. p. 43.

In slight cases of acute bronchitis, limited to the trachea and large tubes, the mucous membrane will be found red and inflamed, generally or in patches, with more or less abundant secretion. If the attack involve the middle bronchial tubes, we shall find the redness and abundant secretion, with dilatation of the tubes, in proportion as the disease has been of long standing. In the capillary bronchitis, the extremities of the tubes are closed, partly by the swollen state of the mucous membrane and partly by the accumulation of puriform secretion, notwithstanding the considerable dilatation which takes place in a few days. Not unfrequently, in this form of the disease, we find evidence of lobular pneumonia or of atelectasis. Chronic bronchitis will generally be found to occupy at once the large bronchial tubes, some of the middle size, and more slightly the smaller ones. Its principal pathological characters are, the abundant secretion, the hypertrophy of the mucous crypts, whose orifices are enlarged, hypertrophy of the longitudinal fibrous tissue, and of the muscular fibres of the trachea and bronchi, and marked dilatation of the middle and terminal bronchial tubes.

A word or two upon some of these details may not be amiss.

The redness of the mucous membrane, which is very commonly seen, is not always present, even in very marked cases. It is generally diffused, and as visible where the membrane passes over the cartilaginous rings as in the interspaces. If it appear only in the latter, we may doubt whether it be not rather due to the subjacent tissues.

There can be very little doubt that the mucous membrane is thickened, as the result of inflammation, although it is not very easy to demonstrate it: nor can we attribute the obstruction of the smaller tubes entirely to this cause. MM. Rilliet and Barthez occasionally met cases of bronchitis in which the mucous membrane was softened, thickened, and rough, but never any in which it was ulcerated. M. Barrier found it ulcerated only in cases in which tubercles also existed. M. Fauvel detected ulceration in one case of pseudo-membranous bronchitis. We must be careful not to mistake the enlargement of the orifice of the mucous crypts for small ulcers.

Bronchitis rarely continues for any length of time with infants, without causing dilatation of the bronchial tubes, as the direct consequence of inflammation. Sometimes it may be observed in the course of the tubes, in other cases at their extremities. In the latter case, if the lungs be incised, the surface presents a number of rounded areolæ, and, if pneumonia co-exist, these are surrounded by denser tissue. Some care is necessary to demonstrate the dilatation of the branches of the bronchiæ, but it is not difficult to ascertain it. It is easy to understand how much this dilatation, if extensive, must increase the difficulty of breathing, by pressure upon other tubes; and, if we remember that the quantity of secretion is excessive, we shall cease to be surprised at the amount of dyspnoea in capillary bronchitis. This secretion varies in character according to the extent and duration of the

inflammation. At the commencement there is little, if any, but in the course of a day or two we find a clear, viscid, frothy mucus expectorated, generally white, sometimes yellowish, if the attack be mild. But if it be severe, or of longer standing, the fluid is more puriform, less aerated, and of a yellowish color. Rilliet and Barthez found occasionally shreds of false membrane mixed with the puriform matter, and in some cases false membrane alone. It is seldom that the large tubes are so far filled with it as to impede the entrance of air, but the smaller terminal ones are often completely choked up.

M. Barrier has mentioned other accessory pathological phenomena, discoverable upon dissection, as redness, swelling, softening, and sometimes suppuration of the lymphatic glands, near the primary division of the bronchi; an emphysematous condition of the lungs, depending upon a dilated condition of the vesicles. I may add, that the traces of lobular pneumonia are common, nor is it very rare to find tubercles, and some traces of pleuritis. Rilliet and Barthez have given the following numerical estimate of the occurrence of these morbid changes:—In 174 autopsies of patients who died of bronchitis, redness of the mucous membrane existed in 143; and in thirty-four cases this was co-existent with softening and thickening. Out of the 174 cases, there was dilatation of the bronchial tubes in seventy-four; in sixteen dilatation of the “vacuoles;” in seventeen there was vesicular bronchitis; and in ten, false membranes were discovered in the bronchia.

Modifications and Complications.—I have already alluded to *secondary* bronchitis, which is the most important *modification* of the disease. It is very common in many other diseases, especially the eruptive fevers. We find it very troublesome in whooping-cough, measles, scarlatina, smallpox, infantile remittent, &c. In many cases it proves a serious addition to the primary malady, requiring care, vigilance, and promptitude; in other cases, the attack being slight, it is of no great consequence. Our judgment upon this point must be formed by a careful estimate of its intensity, the effects of the primary disease, and the state of the child's constitution. The symptoms and physical signs do not differ materially from those already described, but they may be masked, or our attention diverted from them by the importance of the original affection.

The most frequent *complication* of bronchitis is *lobular pneumonia*, and that kind of congestion which, if not checked, runs on into pneumonia. A careful examination in such cases may possibly detect dullness on percussing some portions of the chest, and there is a mixture of subcrepitus with the mucous and sibilant râles of bronchitis. I need not say that such a complication adds much to the danger; it renders the treatment somewhat more complicated and doubtful also.

Again, the disease may give rise to *emphysema of the lungs*, in consequence of the dilatation of the extreme ends of the bronchial tubes, or of the air-cells; and we shall find the usual physical signs of the disease, enfeebled respiratory murmur, dry crepitus, and rather unusual reso-

nance on percussion, if the tubes be not filled with muco-puriform secretion. Although it may add to the tediousness of the illness, I do not know that I could say that it adds to the danger.

The disease may extend itself upward to the larynx and trachea, giving rise not to croup, but to a modification of laryngitis, with hoarse cough and rough voice, but with no metallic sound.

Lastly, it is a doubtful question how far bronchitis may be the forerunner of tubercles. M. Fauvel says it is rare to find tubercles in these cases, and Rilliet and Barthez confirm his statement, so far as the rapid, acute form is concerned, but they are not so clear that they may not complicate chronic bronchitis—whether as a primary or secondary affection may, of course, be doubted. Certain it is that in patients who have died with bronchitis, tubercles, generally in a crude state, have been found.

Causes.—Among the predisposing causes we must include other diseases, in the course of which bronchitis occurs as a secondary affection. Thus, of 115 cases of simple bronchitis, Rilliet and Barthez found that but twenty-one were primary. It may also result from the suppression of an eruption to which the constitution is accustomed.

Age appears to have an evident influence upon the production of bronchitis, whether primary or secondary. Rilliet and Barthez state that the majority of their cases were before the age of six years. Dr. Condie mentions that in Philadelphia, from 1835 to 1845, 1172 deaths occurred from bronchitis, of which 643 were children under one year; 276 were children from one to two years; 201 from two to five years; forty-seven from five to ten years; and five from ten to fifteen years of age.* Of twenty-three cases which occurred to Dr. Meigs, eight were under two years; ten between two and four years; three between four and six; and two between six and ten years of age.† M. Barrier explains this by the greater demand for mucous secretion in infants, to protect the membrane from contact with the air; and this normal activity, which is extreme, is on that account easily increased beyond the bounds of health.‡

Primary bronchitis occurs most frequently in girls, and secondary in boys; the latter owing, probably, to the greater frequency of those diseases in boys, in the course of which bronchitis occurs as a complication. No doubt much depends upon peculiarity of constitution; it is more common among weak and cachectic infants, or those with an hereditary disposition to catarrhal affections. It may be excited by cold, damp clothes, exposure to inclement weather, low, damp habitations, the prevalence of east or north-east winds, smoke or noxious gases, disordered liver, stomach, and bowels, or dentition.

* Diseases of Children, p. 88.

† Diseases of Children, by Dr. Meigs, Jun., p. 106.

‡ Mal. de l'Enfance, vol. i. p. 317.

Lastly, either primary or secondary bronchitis may occur as an epidemic, and generally with considerable fever, dependent, probably, upon some peculiar atmospheric influence, constituting the formidable complaint which in France has received the name of "la grippe," and in these countries the influenza. Such was the epidemic of 1557, described by Valleriola: of 1580, by Sporisch; of 1733, by Storch; and of 1743, by Huxham, in which great numbers of infants perished. In a paper published by M. Petugain, on the epidemic of 1837 in France and Italy, he observes: "Infancy has escaped better than other ages in Paris, at Lyons, at Geneva, at Corbeil, at La Reole, at Milan, at Padua, and at Leipsic. At Lyons, out of three hundred intern students of the College, about two hundred were attacked, and of these eighty were under fifteen years of age. During the height of the epidemic infants were most frequently attacked. Sick children as well as old people were seriously compromised by it. The nasal mucous membrane was the seat of violent congestion, in consequence of which epistaxis was very common (one in ten, according to Brachet), which sometimes threatened danger by its abundance, in other cases afforded relief. Age exercised great influence upon the mortality. In London the disease made great ravages among old people, young children, and invalids. In Italy, as in France, it was old persons who chiefly suffered. At Geneva more elderly people died than all other ages together. Very young infants, under two years, died in great numbers, according to M. Lombard."

In the winter of 1846-7, the influenza prevailed very extensively in Dublin, though it did not prove very fatal. I shall give the following extract from a paper I published on the subject in the *Dublin Journal*, as the best description I can give of the epidemic:—"The number of cases that I have seen within the last two months, and from which my remarks are drawn, exceeds sixty; and they embrace children of all ages, from two months old to twelve or fourteen years. I may add that, in addition to the children, in many cases, the parents or servants were similarly affected. I think that, without exception, the younger the child the more severe was the attack. The mode of invasion varied a good deal. In some instances the whole family seemed to submit to the epidemic influence at once, and all were laid up; in others, one or two would present the epidemic character well marked, and the others complained merely of a slight cough, accompanied in a day or two by feverish symptoms; whilst occasionally each child took sick successively, allowing the one first attacked to recover previously. The characteristic features of the complaint, as in previous epidemics of influenza, have been affections of the chest, invariably accompanied by smart fever. Coughs and colds, without fever, are common enough, but I exclude them, as not true cases of influenza. The fever sometimes preceded the cough, but more frequently came on about the second, third, or fourth day. The child was heavy, dull, cross, and cold, creeping to the fire, and unwilling to exert itself, or to share in its

usual amusements. The skin became hot, florid, and the pulse very quick, ranging from 130 to 160. There was, perhaps, rather less thirst than one would expect from the degree of fever, and the secretion from the kidneys is scanty, and sometimes high-colored. The tongue was always foul, and loaded with white fur; sometimes, though but rarely, dry; the appetite was lost; and occasionally I have seen vomiting or diarrhœa, but generally both stomach and bowels were steady. In almost all cases the child has been restless and uneasy at night, sleeping little, and in a few instances slightly delirious. As regards the local affection, I have observed three varieties, often quite distinct, but occasionally two occurring in the same child. 1. In the milder form of the disease, the primary bronchial tubes were the portion of the respiratory system affected, and this was most common among the elder children. The attack began by a frequent cough and a degree of hoarseness, indicating that the larynx and trachea were somewhat affected. The hoarseness often subsided, but the cough continued very troublesome, with free expectoration after the first day or two. In two cases of young children (*i. e.* under four years of age), the larynx was more seriously affected, and the disease began by an attack of well-marked croup, which subsided in one case in ten or twelve hours, and in the other in two days, leaving behind it the form of influenza I am describing. The cough gave a good deal of pain, and the elder children describe it as scraping the chest. After a day or two the fever was developed and the cough not less troublesome, and for some days the child suffered great distress; until the fever subsided, the cough diminished, and the expectoration became more abundant. When the lungs were examined with the stethoscope, they were found generally free from abnormal sounds, and the respiration vesicular and natural; but the respiration through the large bronchial tubes gave a rough and slightly sonorous sound. Percussion yielded a clear and perfectly natural sound. 2. The second form of the disease affected children of all ages, and consisted of more or less intense bronchitis of one or both lungs, with great congestion of those organs. In these cases respiration was much more rapid, and performed with some difficulty, a wheezing being audible at some distance. The imperfect aeration of the blood showed itself in the dusky red color of the cheeks, which, in some severe cases, were nearly livid. The cough was incessant, the mucus abundant; but as little children do not expectorate, this rather added to the distress. The fever set in nearly as soon as the bronchitis, and in some cases ran very high. In some instances the attack was so severe that suffocation was imminent; but these, with some difficulty and delay, recovered. When the chest was examined, its movements indicated considerable difficulty of respiration, and the respiratory murmur was lost in a variety of bronchitic râles, mucous, sibilous, and sonorous, varying according to the extent and intensity of the attack. Mixed with these is frequently heard a crepitus; not the small, distinct, crepitus of pneumonia, but larger and more moist. Percussion yielded

a pretty clear sound generally, with a diminution of tone occasionally in different parts; mainly, I think, in those where the crepitus occurred. In the progress towards convalescence the crepitus first disappeared; then the movements of the chest became less labored, and the respirations less frequent; the distress diminished, and the fever subsided gradually. The bronchitic râles continued in a minor degree for a considerable time; and, what was very remarkable, in a great number of cases, as the general bronchitis diminished, I found the primary tubes, and even the larynx become affected. 3. The third form which I observed the affection of the chest to assume was either simple pneumonia, or mixed with a moderate amount of bronchitis, and, I believe, this form occurred only in young children; I do not remember any case of it in children above five years old. Its commencement in most cases was very obscure. The child labored under high fever, with very rapid breathing, but very little cough. It looked very like a case of remittent fever, and in one or two cases I believed at the first moment it was so, and examined the chest as a matter of duty, to make sure, rather than with any expectation of detecting serious disease. In these cases double pneumonia existed. The respiration in all was, as I have said, extremely rapid, with great action of the *alæ nasi*, but without the labored movements of the chest, which occurred in the last variety; the face was flushed, with the centre of the cheek of a florid red color; the pulse very frequent; the thirst considerable, with great restlessness. The usual crepitant râle of pneumonia, clear, small, and distinct, was present, mixed in a few cases with mucous or sibilant râles. The part of the chest affected was dull on percussion. Under the treatment adopted, the signs of pneumonia gradually disappeared, and, in proportion, the fever subsided, the cough generally increasing for a time, the chest became clear, and the little patient slowly recovered. Of course this form of disease involved the greater danger; and of some of the patients I had but slender hopes, as they were children of weak constitution. As to the treatment, it was simple and successful. On the accession of fever in all the varieties of local affection, I found it most advantageous to give an emetic of ipecacuanha in the two first, and of tartar emetic in the last, and to prolong the nausea for an hour or two. In the second and third varieties I found leeches necessary when the attack was severe, the respiration hurried and difficult, the pulse quick and strong, and the child able to bear them. In most cases, after these preliminaries, I ordered a mixture of ipecacuanha wine, paregoric elixir, and almond milk, to be given at short intervals; but when pneumonia exists, the tartar emetic mixture is better, and if it should produce great depression, this may be corrected by ammonia. A small quantity of ammonia in the former mixture was advised by Dr. Stokes in some of the cases, and with immediate benefit; it seems to relieve the congested state of the bronchial mucous membrane as much as anything I have tried; or if it do not answer, from two to five drops of spirits of turpentine, in mucilage and water, every three

or four hours, may be given; in several cases it was very beneficial. If these mixtures disagree with the stomach, or after they have produced their effect, or at the same time that they are exhibited, small doses of calomel, ipecacuanha, and James's powder, may be given with advantage. As to the external applications, I found it necessary, in some cases, to have recourse to blisters, but not very frequently, partly on account of the annoyance they are to young children, but principally because I found a very good substitute in poultices, which I think worthy of a more extensive use than they obtain. They are best made of linseed-meal, and should be applied directly to the surface, warm, and very moist, changing them every two hours, or oftener. If irritation be desired, a dessertspoonful of the flour of mustard may be mixed with the meal. Warm baths are exceedingly useful, and may be used every night, provided the child do not cry much; if it do, it will be better to bathe or foment the feet."

Diagnosis.—There is seldom much difficulty in diagnosis; the physical signs are generally sufficiently clear; the chest is sonorous on percussion, and there are abundant mucous and sibilant râles to be heard.

1. The absence of crepitating râle and of dulness will ordinarily distinguish the case from *lobular pneumonia*; but as the two diseases may be co-existent, of course we cannot come to so decided a conclusion in every case.

2. The cough in capillary bronchitis occurs in paroxysms, like the kink in *pertussis*, and for some little time the absence of the hoop may not be conclusive; but if this continue, and if the physical signs of suffocative catarrh predominate, we cannot have much doubt.

3. It is more easy to mistake a case of chronic bronchitis for one of *phthisis*, inasmuch as we find cough, emaciation, evening exacerbations, and night-sweats in both; but a very careful examination of the chest will show that many of the physical signs of tubercles are absent, and that those of chronic bronchitis already noticed, which are present, differ considerably from those of *phthisis*.

Prognosis.—The simple form of bronchitis is not in general very serious, unless it be secondary, and then its importance will rather be owing to the original disease. When the entire mucous membrane is affected, the case is, of course, very serious, and will often prove fatal. Suffocative catarrh is certainly the most fatal form of the disease in these countries.

The increase of the dyspnœa, the severity of the cough, the feebleness and irregularity of the pulse, the oppression, anxiety, and rapid breathing, indicate a fatal termination to the attack; while a gradual mitigation of the symptoms, diminished dyspnœa, a firmer, slower pulse, &c., are favorable.

Treatment.—There is an important distinction between catarrh in the adult and in infants. When the first stage is passed with the former, and profuse secretion takes place, the disease is essentially over-

come, and the patient rapidly becomes convalescent ; but in the infant, although a certain amelioration takes place when the second stage is established, we cannot always be sure of a favorable termination ; for if the bronchial secretion be prolonged, and if it occupy the smaller tubes, there is considerable danger of lobular pneumonia, unless the treatment be continued.

The indications we should have in view are : 1. To diminish the inflammation ; 2. To remove or lessen the secretion ; 3. To support the strength ; and 4. To relieve certain symptoms when it is impossible to do more.

When the attack of simple bronchitis is slight, it will often be sufficient to exhibit demulcents and expectorants, with the use of a stimulating liniment to the chest. Almond milk, with ipecacuanha wine and syrup of squills, answers the purpose very well. Should the secretion be abundant, an emetic will be very useful ; and as the disease advances, the addition of a little paregoric will both relieve the cough, and, to a certain extent, control the secretion. A poultice of bread and milk, or of linseed-meal is very soothing, and if it be desirable to excite irritation, a little flower of mustard may be added ; or the compound camphor liniment used.

But when the attack is more severe, it will be necessary to commence with more active measures. An emetic, followed by a warm bath, will generally afford some relief ; or it may be advisable to apply leeches to the chest, or to cup, regulating the amount of blood abstracted by the age and strength of the child. This will be particularly necessary when the breathing is much hurried, the pulse quick, and the skin hot, whether the affection be of the large tubes or the smaller. All authorities are agreed upon the propriety of blood-letting, and generally that it should be carried so far as to make an impression upon the disease, provided we see the child at the commencement of the attack. It is far less efficacious, and should be more cautiously used at a later period. After the bleeding is stopped (which should be instantly the leeches fall off), the child should be put into a warm bath, and then returned to a warm bed. A little calomel and James's powder may be given once or twice a day, with a purgative when necessary. The demulcent and expectorant mixture should be continued, but unless the secretion be very abundant, there is no object in repeating the vomiting.

When the fever is lessened, and the pulse reduced in frequency, great benefit will be derived from counter-irritation, either by blisters or a strong liniment. Upon the whole, I think the blisters answer best ; but if we wish merely to irritate the skin, compound camphor liniment, or a linseed-meal and mustard poultice (one-third of the latter to two-thirds of the former), will be sufficient. This may be followed by an ordinary poultice, of the soothing, beneficial effects of which upon the lungs, practitioners seem scarcely sufficiently aware. The best proof of this is, that the children like it, and ask for a second application. It

should be applied to the surface with nothing intervening, and should be warm and moist. When it cools, it should be exchanged for a fresh one.

In *suffocative catarrh* we must have recourse to similar remedies, but there are others which will be necessary. The decoction of senega root has been highly extolled, and I think with reason, especially when combined with ammonia and ipecacuanha wine. The two remedies I have found most efficacious in relieving the smaller bronchial tubes, are ammonia, with ipecacuanha or tartar emetic, or spirits of turpentine. The formulæ I generally employ are the following:—

R.—Mist. amygdal. ʒij.
 Vini ipecacuan. ʒj. vel. antim. tart. gr. j.
 Carbon. ammoniæ, gr. vj. or gr. x.—M..

A teaspoonful may be given to a child of a year old every three or four hours, and the quantity of ammonia may be increased or diminished according to the age. Or,

Mucil. acaciæ.
 Syr. simpl., āā ʒij.
 Spts. tereb. rectif. gtt. xx. to gtt. xxx.
 Aquæ carui, ʒij.—M.

A teaspoonful to be given every two, three, or four hours.

From these medicines, I have found great benefit, after bleeding, warm baths, &c. In many cases, I have found the tartar emetic mixture act quite magically in relieving the chest; but it is necessary to watch, lest it produce too much depression, in which case the ammonia may be increased or the tartar emetic omitted, or a little weak wine and water given. I quite agree with M. Barrier and others that active bloodletting is essential in severe cases of capillary bronchitis, and that it should be followed by other evacuants, as emetics, purgatives, &c.; but in cases not so severe, and in weak, delicate children, the tartar emetic supersedes the necessity for bleeding. Benefit will also be derived from small doses of Dover's powder, or the addition of a drop of laudanum to the expectorant mixture.

Counter-irritation is of great value in capillary bronchitis, and certainly blisters answer the purpose better than milder irritants. I have found more benefit with young children from a succession of small blisters than from a large one, with far less distress and exhaustion. A large poultice to the chest, without blistering, or over the dressing of the blister, has a most soothing effect. It should be changed every half hour, and continued for two or three hours.

In that form of the disease described by Dr. Parrish, he ordered "a warm bath, sinapisms to the feet, a large blister over the breast, and laxative injections, containing assafoetida. But the remedy on which

I chiefly relied was assafoetida, rubbed up with mint water, given frequently in large doses." However, as other remedies were employed, they may have had as much influence as the assafoetida. Dr. Parrish ordered a drachm of the gum to be rubbed up with an ounce of mint water, and a teaspoonful to be given every two hours.

For the catarrhal fever described by Dr. Eberle, he first freely evacuated the bowels, and then, if the pulse were full and quick, leeches or the lancet were freely used; after which, antimonials, calomel, and ipecacuanha, with a mixture containing small doses of tartar emetic, were employed. When the febrile action had been moderated, small doses of Dover's powder were found beneficial. He found an occasional emetic very useful, and an expectorant mixture, composed of equal parts of paregoric, syrup of squills, and sweet spirits of nitre, with water.

Chronic bronchitis will require a somewhat modified treatment. We cannot here use bloodletting very freely, nor in every case. I do not mean to say that there are no cases in which it may be necessary, but as a general rule it should be avoided. We must content ourselves with free evacuation from the bowels, an occasional emetic, repeated counter-irritation, diuretics, and expectorant mixtures, containing the stimulating balsams. Decoction of senega, with carbonate of ammonia, balsam of Tolu, Peruvian balsam, &c., will be found very useful.

If, as is commonly the case, the disease be complicated, it will be of great importance to relieve the complication; indeed, we shall scarcely overcome the chronic bronchitis without previously effecting this. In most cases, tonics will be necessary; and of these, perhaps some of the vegetable bitters, as quinine, infusion of cascarilla, gentian, &c., will be found the best. It may also be necessary to allow a better diet than in acute cases.

In either form of the attack, but especially in the acute, the air of the room the child inhabits should be fresh, and the temperature equable and warm. It is much better even when the disease is slight, to confine the child to two rooms, and not to allow it to run about the house, as the frequent change of air irritates the delicate mucous membrane, and keeps up the cough. In capillary bronchitis, it will be still more necessary to keep the infant in a warm temperature; and this course must be continued during convalescence. For some years past, I have been in the habit of recommending a very slight flannel waistcoat next the skin after these attacks, with the best effects. In fact, this climate is so variable that it is an excellent precaution to adopt at the beginning of winter, before the child takes cold; and children who can walk are so apt to stand still after heating themselves that it is next to impossible to escape a chill without some such precaution.

The diet of the child should at first be very moderate. In most cases, the appetite is lost, and no child will eat without one, so that

there is no danger of overfeeding. As convalescence proceeds, we must gradually increase the quantity and quality of the food, taking care to keep up the strength without overloading the stomach.

CHAPTER VII.

INFLAMMATION OF THE LUNGS.—PNEUMONIA.

INFLAMMATION of the substance of the lungs is a disease rarely or incompletely noticed by older writers, and often passed over very superficially by more modern authorities. We are more indebted to the researches of continental physicians than to those of our own country for the information we at present possess. MM. Duges* and Guersent† were the first to investigate the subject, and they were followed by Leger,‡ Denis,§ Brunet,|| Gerhard,¶ Cumming,** Valleix,†† Billard,‡‡ &c. ; but probably the most valuable contribution to the history of the disease is to be found in the works of Rilliet and Barthez,§§ Barrier,||| and Dr. West,¶¶ of London.

Notwithstanding that the disease has been so often slightly treated, it is sufficiently frequent in children of all ages and in different circumstances. For example, the registered deaths in Great Britain for 1839 show that 18,151 children—10,000 males, and 8151 females died of pneumonia; and in Philadelphia, during the ten years preceding 1845, of 26,510 deaths, there were 1592 cases of this disease. In the

* Recherches sur les Mal. les plus import. et les moins connues des Enfants nouveaux-nés.

† Dictionnaire de Médecine.

‡ Essai sur la Pneumonie des Enfants.

§ Recherches Anat. et Phys. sur quelques Mal. des Enfants.

|| Mém. sur la Pneumonie lobulaire.

¶ American Journal of Med. Sciences, vols. xii. xiv.

** Trans. of Assoc. of Coll. of Physicians in Ireland, vol. v. p. 28.

†† Clinique des Mal. des Enfants nouveaux-nés.

‡‡ Traité de Mal. des Enfants.

§§ Traité Clinique et Pratique des Mal. des Enfants, vol. i. p. 60.

||| Traité pratique des Mal. de l'Enfance, vol. i. p. 45.

¶¶ Lectures on the Diseases of Infancy and Childhood, p. 175.

appendix to the Registrar-General's Report for 1841, we find that of 1,000,000 children living in the country, 905 died of pneumonia, and 2028 out of the same number of children living in towns. M. Guersent states that the three-fifths of the children dying in Paris before the completion of dentition, die of this disease. This is sufficient to prove the frequency of the disease, and to show that it deserves our most careful and minute consideration.

Recent researches since have established a distinction between pneumonia affecting an entire lobe of the lung, and pneumonia affecting the lobules. The former, lobar pneumonia, resembles the disease in the adult; the latter, lobular pneumonia, is peculiar to children, but some eminent authorities, Legendre, Fuchs, and Dr. West, consider that the latter is not pneumonia, but atelectasis. According to Rilliet and Barthez, and Barrier, lobular is much more common than lobar pneumonia, Rilliet and Barthez give the results of eighty-four cases of the former; and 203 autopsies of the latter. Of eighty-one cases of pneumonia, M. Barrier found twenty of lobar, and sixty-one of lobular pneumonia. We should bear in mind, however, that the proportion may differ, according as our observations include the children of the rich or those of the poor; those cases which we meet in private practice or in hospitals. M. Friedleben conceives that true lobar pneumonia is very frequent in early life, and that lobular pneumonia is for the most part confined to the first year. But, what it is of more practical importance, either form may be primary or secondary, although, as Barrier observes, lobular pneumonia more frequently constitutes the secondary attack.

I shall endeavour to lay before the reader a short sketch of the characteristic symptoms of each variety, and then notice the difference to be observed according as the disease is primary or secondary.

Symptoms.—I. *Lobar Pneumonia.*—This form of the disease, at least when primary, is rarely preceded by catarrh; the child exhibits a degree of fever, with a hot skin, quick pulse, thirst, &c., for a few days, during which time a short cough may be observed, less strong and frequent than in adults, dry at first, and with little or no effort at expectoration. This cough continues, and increases in frequency in most cases, but we have not the advantage of the peculiar expectoration of adults, for very young infants swallow the expectoration, if there be any, and in general up to five years of age it is not peculiar; from five to fifteen, although the pneumonic sputa may frequently be observed, they are absent in many cases. Very often the cough is not accompanied with pain in the chest, but in some cases, when the child is old enough to complain, we find pain circumscribed to the seat of the disease; in others, it is diffused and obscure, sometimes at the epigastrium and radiating to the abdomen; sometimes near the base of the lung. Dr. Gerhard observed it most frequently at the anterior edge of the axilla.

The dyspnoea, Barrier remarks, is greater than in adults; "thus it is

not rare to find a pneumonia occupying the lower half of one lung, cause from forty to sixty respirations per minute, whilst in the adult it would require very extensive disease to produce the same effects."* And from a careful register of nine patients, he finds that the frequency of the movements of the thorax, compared to those of the heart, were as 1 to 2.69. The respiration, then, is short and rapid; from 40 to 60 or 80 per minute. Nay, Dr. Cumming† mentions a case in which it amounted to 118; but although the frequency may in part be owing to the amount of disease, it appears to be partly an involuntary precaution to avoid the irritation and cough consequent on a full inspiration. Sometimes this hurried respiration intermits, and for a short time the respiration seems natural; but very speedily the rapid movement is resumed. This acceleration of the respiration and pulse is said to be at its height on the fourth or fifth day; and by the seventh or ninth, if the case progress favorably, the pulse diminishes in frequency, and the respiration becomes more calm and deliberate. If the disease increase, the respiration becomes more labored, not less rapid, but with greater muscular effort; the chest heaves, the *alæ nasi* dilate, and even the momentary interruption caused by speaking seems to add to the distress of the lungs. There is an effort now and then to fill the lungs by gaping, sighing, &c. but it appears to be ineffectual; the congestion is so great that it impedes both the circulation in the lungs and the respiration. Rilliet and Barthez have remarked that the irregular, abrupt respiration occurred almost exclusively when the summit of the lung was principally affected. When the disease proves rapidly fatal, the frequency of respiration goes on increasing until death; but when the disease is prolonged, we may observe a diminution during the last few days, not from any amelioration, but probably from a degree of organic insensibility.

The pulse is very quick from the beginning, seldom under 120, even in cases where the distress does not appear very great; but it often exceeds this, and may reach 140, 160, or even 180, especially with young children. At the commencement it is generally full, strong, and regular, and in favorable cases it gradually becomes softer and slower; but in unfavorable, whilst it preserves its frequency, it becomes extremely small, irregular, and at length insensible. The heat of skin bears a relation to the rapidity of the circulation; during the first part of the attack, the skin is dry and very hot; towards the end, in unfavorable cases, although the pulse is equally, or even more rapid, the skin becomes cooler, and moistened with clammy perspiration.

The decubitus is sometimes dorsal, sometimes on one side or the

* *Mal. de l'Enfance*, vol. i. p. 193.

† *Trans. of Association*, vol. v.

other, apparently owing to the effect upon the thoracic pain or uneasiness.

The expression of the face is that of great distress, sometimes flushed, sometimes pale, or more frequently with a patch of vivid red on one or both cheeks. The *alæ nasi* are in active operation, dilating just before or with each inspiration, and the nares are dry, for young infants rarely breathe through the mouth. Rilliet and Barthez have noticed the blue circle which appears beneath the eyes, and which increases with the progress of the disease, especially when there is much emaciation.

The *physical signs* of lobar pneumonia are of great importance, from the frequent absence of the characteristic sputa of pneumonia. They, however, do not differ much from those observed in the adult, and therefore I need not dwell at length upon them. Percussion yields a distinct dulness of sound in the affected part, compared with those portions of the lungs which are free; but we must be on our guard against making the opposite side a standard of comparison, as both lungs are frequently involved; different portions of the lungs, as well as both sides, must be carefully percussed, and it will rarely be difficult to satisfy ourselves.

The crepitant or sub-crepitant *râle* will be heard in those parts of the lungs still in the first stage of inflammation; but when the respiration is very quick and short, it is less characteristic, and will require that we make the child cough, or take a deep inspiration. With infants who cannot comprehend our directions, the best way is to stop the breath for a moment; the effort to resume it will insure a deep inspiration. The *râle* may occupy a small portion, or nearly the whole of the lung; it may be heard at the superior, middle, or inferior portions. Not unfrequently, when one lung only is affected, we shall find puerile respiration in the other. When extensive hepatization has taken place, little or no crepitus will be audible, except around the diseased portion, but instead we may find bronchial respiration, and something resembling bronchophony, with extreme dulness.

In the third stage, the stethoscopic signs are pretty nearly the same as in the second, except that the bronchial respiration is more distinct and also more extensive, occupying situations where crepitation had not previously been heard. It becomes audible in front as well as posteriorly, and is perceived, along with dulness on percussion, in the *infra-mammary*, as well as in the *infra-scapular* region. It is generally more extensive on one side than the other, and occasionally it is audible throughout the entire back part of one side of the chest. It is never confined to the upper part of the lung, unless there have existed previously tubercular disease. Dr. West observes that bronchial respiration must always be considered of serious import; in eleven out of twenty cases of pneumonia, where it existed, the disease terminated fatally.

The appetite is lost from the beginning in severe cases; the tongue is white and loaded, sometimes moist, but generally dry, probably from the endeavour to breathe through the mouth; and the thirst is considerable. In very young children Dr. West has noticed a peculiarity of sucking. Vomiting occurs occasionally at the commencement of the disease, and more frequently than with adults; subsequently it is generally the consequence of medicine. Diarrhœa, on the other hand, is rare, except towards the termination, or when caused by the remedies.

The secretions are irregularly and variously affected; the urine is high-colored at the beginning, and occasionally scanty, but in many cases but little altered. The liver is less affected than in adults; nevertheless, jaundice does sometimes, though rarely, occur, and in such cases, MM. Chomel and Bouillaud* conceive the base of the right lung to be the seat of the disease, and the jaundice to be the result of its proximity to the liver; but M. Grisolle has adduced evidence to show that this can scarcely be the reason.† Others have asserted that the jaundice is not the result of the peculiar condition of the liver, but of the incomplete hæmatisis caused by the pneumonia, and that it is analogous to the jaundice determined by purulent infection.

It is unnecessary to state that the strength of the patient is greatly depressed, and that in a very few days it is in every way alarmingly reduced. The nervous system does not escape; there is generally a good deal of anxiety and agitation, especially at night. In other cases there is headache, and a degree of stupor; in a few cases delirium or convulsions. In some cases, as M. Tonnelier has remarked, these nervous symptoms may be the result of sympathetic irritation, but in others they appear to depend upon coincident meningitis.

Duration and Termination.—Lobar pneumonia in children, like the same disease in adults, commences, as we have seen, by rigors, heat, cough, pain in the chest, hurried respiration, dyspnœa, and quick pulse; these symptoms continue, and perhaps increase for a time, but when the treatment is successful they gradually diminish. The pulse becomes slower, the respiration calmer and less labored, the pain disappears, and the cough is softer; then the appetite returns, the tongue becomes clean, and the strength is gradually regained. Unfavorable cases, on the other hand, are marked by an increase of the symptoms, the respiration becomes more hurried and labored, the alæ nasi moving incessantly; the cough short, frequent, and distressing; the pulse small, weak, quick, and at length irregular or intermitting; the face livid; the eyes sunken; the lips purple, and the surface cold and clammy. Upon the whole, in primary lobar pneumonia the result is favorable; only one in twenty of M. Barrier's patients died.

* Clinique, vol. ii. p. 138.

† Traité de la Pneumonie, p. 384.

The duration of the disease varies somewhat: it is seldom less than from six to twelve days, generally from twelve to eighteen, and frequently longer. Dr. Gerhard states the mean duration to be fifteen days. Of fifteen uncomplicated cases M. Barrier mentions that the disease lasted ten days in four cases; eleven in two; twelve in one; thirteen in one; fourteen in three; and sixteen, eighteen, twenty, and twenty-five in one case each.

II. *Lobular Pneumonia*.—We will now enumerate the symptoms of lobular pneumonia, which differ in some particulars from those just described, and which, in many cases at least, may be chiefly owing to the disease being secondary, or occurring in the course of some other malady.

In almost all cases it is preceded by pulmonary catarrh; either the latter is the primary disease, upon which pneumonia supervenes, or, being secondary to some other primary disease (as measles, for instance), it runs on into pneumonia. It occurs also more generally in infants and young children, than lobar pneumonia. Of sixty-one cases related by M. Barrier, twenty occurred from two to three years, and twenty more under five years of age, which will account also for some obscurity in those symptoms which depend upon the patient's description. For example, we have reason to believe that there is pain or uneasiness in the chest, but with young infants this can only be suspected from their crying when the cough comes on. In older children it does not appear to be acute and circumscribed, but diffused, and principally in the region of the diaphragm, not troublesome ordinarily, but excited by coughing.

The cough is an important symptom; no doubt it exists before the pneumonia sets in in secondary attacks, but even then its increase will mark the accession of the more serious disease. It continues short and troublesome, dry or moist, until the decline of the disease; but in fatal cases it often disappears for two or three days before death. In some rare cases of latent pneumonia, the cough is nearly absent, and these occur generally in weak cachectic children. The cough does not occur in kinks, neither is it hoarse, unless the disease be complicated. We can derive but little assistance from the expectoration, for in many cases there is but little secreted, and by infants and young children it is always swallowed; but, from some observations he made, M. Barrier is of opinion that, if it occurred, the sputa, in many cases, would exhibit the pneumonic character.

The dyspnœa and hurry of respiration are in proportion to the extent of the bronchitis and pneumonia, and fully as much owing to the former, when severe, as to the latter. Thus, with intense catarrh and a pneumonia of moderate extent, the respirations will occasionally amount to fifty or sixty per minute. On the other hand, when the pneumonia is extensive, and the bronchitis slight, the respiration will be found very rapid and short, with free motion of the *alæ nasi*, and ultimately of the chest and abdomen. "Moreover," M. Barrier

observes, "it is not merely by the number of respirations per minute that we must judge of the extent and gravity of the lesion of the lungs. We must also observe whether the respiration be superficial or profound, if it be easy or painful and anxious, costal or abdominal, regular or irregular. In general, the more frequent, deep, and anxious it is, the more serious is the attack. But we must not forget that occasionally we find the respiration increased in infants for a few minutes, without apparent cause, and that it soon subsides again."

The *physical signs* are of great importance, even though they may not be quite so definite and certain as in adults. Dr. Gerhard lays great stress upon the dulness on percussion; he conceives it in many cases of more use than auscultation. M. Vernois found the dulness very marked in twenty out of twenty-two cases, and slight in the remaining two. M. Valleix found dulness in twelve out of sixteen cases, seven times on the right side, and five times on both sides. Rilliet and Barthez found but little deviation from the normal sound in partial or mammelonated pneumonia, but decided dulness in the generalized form. M. Barrier states that in "disseminated lobular pneumonia" the results of percussion are completely negative, and that there is no dulness unless from some complication; but that, when the disease has gradually spread and coalesced in "generalized lobular pneumonia, the sound is dull on percussion."* My own experience coincides with Dr. West's, who remarks: "percussion sometimes yields a very manifest dulness on the affected side: and this dulness is usually most evident in the infra-scapular region. At other times, however, no such marked results are afforded, but the lower parts of the chest yield a somewhat duller sound than the upper, and the impression communicated to the finger is that of greater solidity below than above the scapulæ. This last sign is very valuable, since it may be perceived at a time when the ear cannot clearly detect any actual dulness on percussion."

In the disseminated or partial form of disease we find the subcrepitating and mucous râles, with an occasional mixture of the sibilant. Rilliet and Barthez lay great stress upon the subcrepitant râle, as being often the only sound to be heard throughout the course of the disease. It is generally audible at the back of the chest, sometimes in front, and at different points, according as the lobules affected may be distant or near. The true crepitant râle is much rarer in infants than in adults, although it is occasionally audible for a few moments.† If one lung only be affected, we shall find the subcrepitant râle on one side and puerile respiration on the other; but if both be affected, as Dr. West remarks, we may overlook the disease, owing to the absence of contrast, unless the disease of one lung be so far advanced as to give

* Mal. de l'Enfance, vol. i. p. 105-7.

† Trousseau and Lasegue, Arch. Gén. de Méd., vol. xxvi. p. 130.

rise to bronchial breathing, whilst in others nothing but the subcrepitus can be detected.

At a more advanced period, or, what is much the same thing, in the "generalized lobular pneumonia," we have present more or less of the preceding phenomena, but with certain modifications. The diseased portions having coalesced, and the lung having become more generally solid, we find bronchial breathing, both in expiration and inspiration in one or both lungs posteriorly, and even bronchial râles and bronchophony. The subcrepitant râle has changed a good deal, the bubbles are smaller, and the crackling much finer; in fact in many cases we find the pure crepitating râle of lobular pneumonia, as in the adult, especially when the disease is superficial. Occasionally these more defined phenomena of pneumonia are masked by the great amount of moist râles, but even these have a sort of metallic sound in this disease, which, taken along with the vocal resonance and the dulness on percussion, may prevent an error in our diagnosis. With regard to the vocal sounds, Dr. West observes: "In the child we lose all the evidence which in the adult is afforded by the different modifications of the voice sound; for the shrill or querulous tone of a suffering child, and the words, often uttered in very different keys, yield, even when the child is old enough to talk well, results far too uncertain to be trustworthy."*

The external appearance of the infant is not characteristic; it will show that the chest is affected, but not the peculiar form of disease. Thus, the face may be pale or colored, swollen and puffy, or red; very often, while the rest of the face is pale, there is a bright spot of red on one or both cheeks corresponding, it is said, to the lung affected. The *alæ nasi* will be found in action in proportion to the hurry and difficulty of respiration, and the eyes appear sunken. The patient lies generally on his back, but is not more distressed by lying on one side than the other, which may be because the pneumonia is frequently double. The pulse varies very much, of course, but it is generally in proportion to the extent of the inflammation; it may range from 100 to 110, with but little heat of skin, in weak, delicate children; to 140, 160, or 180, with high fever, in others. Towards the termination, it either gradually becomes slower and more natural; or quicker, weaker, and irregular, according as the result is favorable or unfavorable. The usual relation between the respiration and circulation is destroyed; in the adult suffering from pneumonia, it is as 1 to 4; in infants, it is as 1 to 2 or 3. The digestive system is more or less deranged; vomiting is frequent at the commencement of the disease, but rare subsequently. Intestinal catarrh, according to M. Barrier's experience, precedes the attack of pneumonia in many cases, and in others we often have diarrhœa

* Lectures on Diseases of Infancy and Childhood, p. 195.

in the course of the disease, especially when it is secondary to measles; and in these cases, if the pneumonia be extensive and advanced, it will be a very unfavorable addition; but if the result of calomel or tartar emetic, it is not of so much consequence. Besides this diarrhœa, however, we have no symptoms of intestinal inflammation; there is neither pain, tenderness, nor tympanitis. As in lobar pneumonia, we may have a certain degree of sleepiness, indifference or cloudiness of intellect; nay, even some more marked nervous affections, as anxiety, agitation, contractions or convulsions, and delirium.

Termination and Duration.—As I have described it, lobular pneumonia may continue steadily advancing, the symptoms increasing in gravity, and the constitution suffering more severely, until death. Or, the disease having arrived at its maximum of intensity, the symptoms may gradually diminish; and, if the termination is to be favorable, this amelioration will affect both the general and local symptoms. In some cases, we have an improvement in some one or two symptoms for a time, and then a return. Such cases generally terminate fatally.

It is more difficult to fix the duration of lobular than lobar pneumonia, because the former being most frequently secondary, and stealing on more or less insidiously, we cannot ascertain the exact period of invasion. Rilliet and Barthez give the following duration in eighty three cases: in twenty, it lasted from one to five days; in nineteen, from six to ten days; in sixteen, from eleven to fifteen days; in twenty, from sixteen to twenty-five days; and in eight, from twenty-six days upwards. M. Barrier remarks that those cases which are cured are of the longest duration; the fatal cases he has never known to last longer than from twenty-five to thirty days. The others may run on for a month or two. M. Friedleben states that in the great majority of children, the first stage lasted for twelve hours, the second for three days, the third from five to seven days, after which convalescence commenced, but that it sometimes proves fatal in from twelve to twenty hours.

Lobular pneumonia may result in *abscess of the lung*, as a termination; but probably in most cases it will escape detection unless purulent matter be expectorated. This, and a large mucous râle, approaching to a gurgle, may enable us to suspect the existence of an abscess when the bronchial tubes communicate with it. In other cases, it may be impossible to decide. Moreover, as these abscesses tend to the surface, and occasionally open into the pleura, the *very sudden* occurrence of pleurisy may lead us to suspect a perforation.

In some rare cases, pneumonia terminates in *gangrene*; the symptoms are those of pneumonia, with extreme depression of strength, profound constitutional suffering, and a rapid course. It seems more apt to attack children, during exanthematous fevers, whose constitution has been much deteriorated; and it is not uncommon to find, at the same time, gangrene of some other parts. Of eighteen cases of gan-

grene mentioned by Rilliet and Barthez, three had gangrene of the mouth, one of the pharynx, two of the œsophagus, one of the larynx and pharynx, one of the bronchial glands and spleen, one of the glands, pleura, and œsophagus, and one of the pleura alone. In Dr. West's case, there was gangrene of the mouth. From all the circumstances, Dr. West infers, and, I think, with great probability, that the gangrene is due rather to some peculiar morbid alteration of the circulating fluid than to the violence of the inflammatory action.

Such are the characteristics of lobar and lobular pneumonia. Either may be primary or secondary; but the lobar is more frequently primary, the lobular secondary. The principal differences are in the mode in which each commences, in the greater amount of fever, the dulness on percussion, the crepitating râle, and the quicker termination of the former; the insidious approach, the greater obscurity of the physical signs, the slight dulness on percussion in the first stage, the diffused subcrepitant râle, the different points at which it is heard, and the changes which it undergoes subsequently, the greater duration and greater fatality, of the latter.

Now let us examine the different characters of primary and secondary pneumonia, whether lobar or lobular.

1. *Primary* pneumonia commences by intense fever, with occasionally a slight bronchitis preceding, in very young children. The respiration is always rapid, with thoracic pain occasionally, and a short, dry cough. Auscultation reveals the existence of crepitant or subcrepitant râles on one side of the chest, and especially towards the base of the lung.

Vomiting occurs at the beginning, and occasionally diarrhœa. There is anxiety, agitation, and sighing. As the disease advances, some of these symptoms disappear, and new ones appear. The fever rather increases, as does the dyspnœa and hurry of respiration; the *alæ nasi* are observed to move extensively, and more effort is required to breathe; the cough is very troublesome, short, and painful; expectoration makes its appearance, except in young subjects; the pulse is very quick; the crepitating or subcrepitating râle gives place in some portions to bronchial respiration and bronchophony, and the chest yields a dull sound on percussion.

These symptoms attain their height about the fifth or sixth day; but, after the eighth or ninth day, in favorable cases, they begin to subside, the fever diminishes, the pulse and respiration become slower, the *alæ nasi* are quiescent, the heat of the skin subsides, the large subcrepitant râle is freely heard, with bronchial breathing more rarely, and chiefly in expiration. The sound of the voice is diffused, and the dulness less marked. By degrees, the appetite returns, the spirits and strength of the child are recovered, the cough diminishes, the fever altogether disappears, and the patient becomes convalescent.

2. When pneumonia supervenes upon another disease, or is *secondary*, it presents very different characters, and the difference is greater, accord-

ing to Rilliet and Barthez, the earlier the secondary affection supervenes upon the primary disease. Secondary pneumonia (most frequently lobular) is apt to steal upon us very insidiously, the pulse, respiration, and countenance, affected by the primary disease, undergoing but little change. The cough may be troublesome, but there is little thoracic pain, and no expectoration. If no cough existed previously, we shall be induced, probably, to examine the lungs, and thus the complication will be detected. The subcrepitant râle will be heard on one or both sides posteriorly. As the disease advances, the fever will increase, the pulse become quicker, the respiration more hurried, the cough more constant; the strength diminishes, and the face will have a worn, anxious, and distressed expression. The chest will gradually become dull on percussion; and, with the subcrepitant râles, we may also hear bronchial respiration and bronchophony, increasing in intensity and extent. The primary disease will generally be found to have undergone an unfavorable change, and with these unfavorable symptoms will at length be found others, such as feeble and irregular pulse, violet color of the face, great dyspnoea, coldness of extremities, &c., which denote the approach of death.

We can readily understand that the secondary must be more fatal than the primary, because the child has to combat a second most formidable disease, at a time when his strength is reduced, and his constitution shaken, by a previous one. Of sixty-one cases noted by M. Barrier, forty-one died.

Complications.—When we recollect the anatomy of the lungs, and consider their contiguity with the tissues which line or surround them, we cannot be surprised at other affections supervening in the course of pneumonia.

I. *Bronchitis.*—In a great majority of fatal cases, evidences of inflammation of the bronchial mucous membrane are found after death, and in a very large number we can ascertain its existence during life, either as a primary or secondary affection. Barrier has proved that lobular pneumonia is preceded, in a very large proportion of instances, by pulmonary catarrh, and that it is, probably, an extension of this latter affection. Rilliet and Barthez have drawn the following conclusions from their experience:—"1. That the bronchitis which coincides with pneumonia is almost always an affection of the small tubes. 2. That in a great majority of cases it co-exists with lobular, mammelonated, partial, and generalized pneumonia; more rarely with lobar pneumonia. 3. That bronchitis, with dilatation, is found almost exclusively in infants who have died of partial or generalized (lobular) pneumonia; almost none in those who have suffered from lobar pneumonia. 4. That bronchitis exists almost always either in the centre of the part hepatized, or in the portions surrounding it, but that it may occur elsewhere. 5. That dilatation of the bronchi is frequent in the carnified tissue."*

* Mal. des Enfants, vol. i. p. 75.

2. *Pleuritis* is a frequent complication of pneumonia, and so intense is it occasionally that the disease may well be called, as it is by some, pleuro-pneumonia. About one-fourth of Rilliet and Barthez's patients, attacked with lobular pneumonia, exhibited traces of recent pleurisy. The proportion of those suffering from lobar pneumonia, who had secondary pleurisy, was even higher; it amounted to one-half. I do not think that the complication is so frequent in this country, or in private practice; but still it does occur, and adds much to the danger. In most cases it is extremely difficult to detect the presence of pleurisy, the symptoms, and even the physical signs, being masked by those of the existing pneumonia; but now and then we may arrive at a just conclusion.

3. When we consider the extreme difficulty of the respiration in some cases, and the violent efforts made by the child, we shall not be surprised that the disease is occasionally complicated by *emphysema*, which is in general in proportion to the extent of the pneumonia and bronchitis, to the acuteness of the disease, and to the amount of dyspnoea which is present.

4. I have already mentioned that lobular pneumonia is occasionally complicated with *convulsions* and other cerebral affections of minor degree. Six of M. Barrier's cases were thus attacked and died. In three there were proofs of meningitis.

But in many cases the pneumonia, whether lobar or lobular, but far more frequently the latter, is secondary, and occurs as a complication in the course of other diseases. It occurs most frequently in the course of measles, but we find it complicating scarlatina and other febrile eruptions, hooping-cough, croup, pleurisy, bronchitis, cancrum oris, intestinal catarrh, typhoid fever, &c.

Morbid Anatomy. I. *Lobar Pneumonia*.—I need not enter at length upon the *post-mortem* appearances found in lobar pneumonia, as they are identical with those in the adult, and will be found laid down in all the modern books on the subject. We find in infants evidences of congestion, red and gray hepatization, extending from the base of the lung towards the summit, but very rarely terminating in abscess. Dr. West has stated the result of forty-seven cases carefully noted: in five, the first and second stages of pneumonia co-existed, and in four, the first and third; in thirteen, the second and third; in eleven, all three stages; in three, the first stage only; in six, the second stage; and in five, the third stage only;* and this, as he observes, agrees very closely with the results obtained by M. Grisolle in the adult. In forty cases, he found that the first and second stage co-existed in four; the first and third in three; the second and third in sixteen; all these stages in two cases; the second stage only in seven; and the third stage only in eight.†

* Lectures on Diseases of Infancy and Childhood, p. 176.

† *Traité de la Pneumonie*, p. 18.

It resembles the pneumonia of adults, also, in being more frequently single than double, and more common in the right lung than the left. Of 1430 cases in the adult, M. Grisolle states that 742 were on the right side, 426 on the left, and 262 double. Of eighty-four cases in children, given by Rilliet and Barthez, forty-eight were of the right lung, twenty-seven of the left, and nine double. Of M. Barrier's twenty cases, ten were of the right lung; six of the left; and four were double. In cases of double pneumonia, both lungs are pretty equally affected. Of seventy-five cases in which a single lung was affected, Rilliet and Barthez found forty-eight in which the base, and twenty-seven in which the summit of the lung was diseased; and of the latter, twenty-three were of the right, and four of the left lung. M. Barrier, in twenty cases, found the entire lung affected in three cases; the inferior lobe in twelve; the superior in four; and the superior lobe with the upper part of the inferior in one case. Observation has also proved that the posterior portion of the lung is more frequently affected than the anterior; and even when the *post-mortem* examination shows both to be involved, the history of the case would lead us to the conclusion that the disease commenced posteriorly.

II. *Lobular Pneumonia*.—Considerable difference of opinion exists as to the true nature of lobular pneumonia, and the exact character of its pathology. It appears to me that its existence as an inflammatory disease is fairly established, and without pronouncing upon the opposite views of Legendre and Bailly, Fuchs, &c., I shall first lay before the reader the ordinary appearances, and by and by refer to the different pathological views held by these ingenious observers. Anatomically speaking, lobular pneumonia is so called from its occupying one or more lobules; and it has been divided into several varieties, mammelonated, disseminated, partial, generalized, with an additional species, by M. Barrier, which he calls pseudo-lobar. "When we examine," observe Rilliet and Barthez, "the lungs of subjects who have died from this disease, we find them extremely soft and flaccid, of a grayish rose color, with patches of violet red here and there, generally circumscribed, prominent, solid under the finger, and not collapsing when the chest is opened, as the surrounding pulmonary tissue does. These patches, ordinarily circular, but sometimes elongated from above downwards, are most frequent at the posterior edge of the lung, but are to be found on other portions. Occasionally they are not visible: but nodosities, more or less deep, can be felt in the substance of the organ." When cut, the lung presents a marbled appearance of a grayish red color, mixed with violet red, the latter corresponding to the external red patches; and we see that these patches and the deeper nodosities are centres of congestion and hepatization, whose characters resemble those of pneumonia generally; *i. e.*, the surface cuts smoothly, is granular when torn, easily penetrated by the finger, and sinks when placed in water. On pressure, these portions of the lung crepitate very little, or not at all, but a sanious frothy fluid escapes: from the central portion,

if pressed, we obtain a red serous fluid, without air, as in lobar pneumonia. The three degrees of pneumonia may be observed: the first with the tissue marbled, of a rose and gray color; the red portions, irregularly limited, somewhat less resisting than the neighboring parts, floating in water; when pressed giving forth a frothy fluid, and crepitating under the finger. This is the first degree; the second has just been described. The third degree is characterized by a gray, yellow, or yellowish gray color, owing to the infiltration of pus in the pulmonary parenchyma. The tissue is very friable, and pressure expresses a purulent fluid. When the tissue is chiefly gray, it is possible to mistake the disease, unless care be used, inasmuch as it presents a resemblance to the surrounding healthy tissue.

The same authors have entered into more special detail, however, and have described three varieties, the mammelonated, the partial, and the generalized. The *mammelonated lobular pneumonia* consists of a small nodule (*noyau*) of hepatization, quite distinct from the surrounding tissue; it is an isolated point of disease, in the midst of healthy or nearly healthy tissue, with its limits clearly defined. The limits are occasionally marked by a white resisting circle or space, like a fibrous capsule; and ordinarily we can define the extent of the diseased portion from its prominence, which results from the shrinking of the surrounding parts when cut through. The volume of these nodules varies from that of a hempseed to a pigeon's egg; their shape is generally regular and spherical, or some analogous form; varying in number from one to twenty or thirty in the same lung. They result, it is clear, from the inflammation being limited to one or more lobules, without extending to the neighboring tissue; but in some few cases they are surrounded by a portion, in the first stage of pneumonia, just as we see in the case of tubercles. In these nodules of hepatization, it is not rare to find the disease attain the third degree, and form an abscess. The pus primarily deposited in the pulmonary tissue is collected in the centre of the inflamed lobule, surrounded by two concentric zones, the inner one of yellow color, the third degree of inflammation, and the outer one of a red color, inflammation of the second degree, or hepatization. By degrees the suppuration is increased, at the expense of the inner circle and of the outer, and the centre is surrounded by a layer of false membrane. If several lobules close to each other have been attacked, the abscess may be multilocular, and each cavity separated from its neighbor by a thin layer of hepatized tissue: or, this being broken through, they will communicate with each other. These abscesses may be situated in any part of the lungs, but they have rather a tendency towards the surface, and we occasionally find an adhesion between the two pleuræ at this point. If this adhesion do not take place, the abscess may open there, and a pneumo-thorax be the result. Rilliet and Barthez met one case in which adhesion took place between the pleura of the base of the left lung and the diaphragm,

and through this adhesion the abscess opened into the peritoneal cavity. M. Barrier differs from the view taken by Rilliet and Barthez of these abscesses, but as I have not entered very minutely into their description, I shall avoid the controversy altogether, and simply quote M. Barrier's conclusions: "Lobular pneumonia may terminate by supuration in three ways: 1. Gray hepatization, when the pus is combined with and infiltrated into the parenchyma, constituting the most frequent and least advanced form. 2. Purulent collection in the lobule, with direct free communication with the corresponding lobular bronchus, which is dilated but not interrupted in its continuity, and which seems to widen in order to form the purulent cavity (*vacuole*). This is far from being rare, and is intimately connected with capillary bronchitis. 3. Abscess, properly so called, or collections of pus, primitively isolated, and closed completely; communicating at a later period with the bronchial tubes, by rupture of its walls. This form is really very rare."* The number of abscesses varies very much; sometimes there is but one, in other cases a great number. They are rarely found in both lungs, and most commonly in the left. Of twenty-six cases, Rilliet and Barthez found abscesses in seven cases, in the right lung, in fifteen cases in the left lung, and in four in both lungs. Eight of these cases occurred in infants from one year to two and a half years old; ten, from three to five and a half; three, from six to ten and a half; and four, from eleven to fifteen years of age.

The *partial lobular pneumonia* is less defined than the mammelonnated; its circumference is confounded insensibly with the surrounding tissue, without our being able to decide upon its limits from the color or prominence. The volume of the diseased portion is often considerable, and its form irregular. The whole may be hepatized; or the outer portion congested and the centre hepatized; and by the extension of the inflammation, many separate points of disease may be united, so as to involve nearly the entire lobe, and so constitute the *generalized partial pneumonia*. When the latter passes into the third degree of inflammation, it becomes, to all purposes, lobar pneumonia, and yet there is a considerable pathological difference. The three degrees of inflammation are evident in both, but they are disposed differently; in the latter, commencing most generally at the base, and ascending, we shall find the lower portions the most advanced, and the superior less so; whereas, in generalized lobular pneumonia, the most advanced portions will be those of longest standing; and as the disease begins at different points, we may find gray hepatization in any part, and congestion or red hepatization occupying the spaces between. Abscess may be the result of this species of pneumonia, but less frequently than of the former. Still more rarely is it found with the lobar pneumonia,

* Mal. de l'Enfance, vol. i. p. 60.

although such cases are on record. Out of 203 autopsies of lobular pneumonia, Rilliet and Barthez met with seventy of the mammelonated, 140 of the partial, and 104 of the generalized pneumonia. Thus it seems quite possible that capillary bronchitis may run on into lobular pneumonia, and lobular pneumonia, by becoming generalized, into lobar pneumonia; but it is far from being a necessary transition.

Carnification.—There is another morbid condition which demands our attention. It has not been described by authors generally, although sufficiently frequent; its existence was first noticed by M. Ruz, in his memoir. He states: "I have observed an alteration of the pulmonary tissue, which is certainly not hepatization, although I am quite ignorant of its symptomatic value. This condition is ordinarily found along the inferior border of the superior lobe; it may also occupy all the middle lobe, or the circumference of the base of the inferior lobe, to the extent of from a line to half an inch in thickness. In these parts, the pulmonary tissue is collapsed, of a violet color, but with whitish patches, which circumscribe the lobules. There is no crepitation; the air appears entirely expelled; one would say that it was a portion of lung, which had not as yet been expanded by respiration. When detached it does not float; it is firm, and when hepatization co-exists, it is not easy to perceive the difference at the first glance."* When cut into, we find a red, smooth, resisting tissue, on pressure furnishing a sero-sanguineous fluid, free from air; resembling a divided muscle in appearance; hence the name. Thus, as to situation and form, it resembles each variety of hepatization; but it differs in that insufflation restores it to its natural condition just as we find in atelectasis pulmonum, which it resembles much. This peculiar condition is nearly as frequent in the right as in the left lung, and more frequently single than double; the most common situation for it is on the left side, near the heart, and on the right side, in the middle lobe. Rilliet and Barthez observed forty-two cases of carnification; sixteen double; seventeen on the right side only; and nine on the left.†

Gangrene of the Lung.—This termination of inflammation is very rare in children. Rilliet and Barthez met with eleven cases; Barrier does not mention the subject; and Dr. West has seen but one case. I shall quote Dr. West's description of the *post-mortem* appearances, as being as concise and accurate, and more vivid, than any I could give: "The right lung, which consisted only of two lobes, was universally solid, and not crepitant, with the exception of about a fourth of the upper and inner edge of the upper lobe, which was emphysematous. The two lobes were connected together by a layer of yellow lymph.

* Journ. des Connois. Méd. Chir., 1835, p. 404.

† Mal. des Enfants, vol. i. p. 74.

The exterior of the lung generally was of a dark reddish-gray color, with irregular patches of yellow deposit beneath the pleura, some of which were nearly half an inch in length and a quarter in breadth; besides which, many small purulent deposits were contained within the pulmonary vesicles, as in vesicular bronchitis. The upper part of the upper lobe, and a small portion near the diaphragmatic surface of the lower lobe, felt soft and boggy to the touch. On cutting into the upper lobe, a cavity was opened as large as a hen's egg, very irregular in form, intersected in various directions by the tubes and vessels that crossed it, from which, as well as from the walls of the cavity, portions of the lung hung in shreds. The cavity contained a small quantity of dirty, grayish-yellow putrilage, which exhaled a most foetid odor. The substance of the lung in the immediate neighbourhood was in a far advanced stage of purulent infiltration, and other parts of the lobe were in an earlier stage of the same condition; besides which, small collections of puriform fluid, not bigger than a split pea, were found in various parts of its substance. The state of the lower lobe on the whole resembled that of the upper, but the cavity in its lower part was not larger than a marble, and contained a small quantity of yellow pus, of a less foetid character than that in the upper lobe. The bronchial glands were swollen, soft, of a homogeneous aspect, and a gray color; but neither in them nor in either lung, nor in any organ of the body, was there the least trace of tubercular deposit."*

So much for the principal lesions of the lung resulting from or connected with pneumonia. I must just notice one or two others more or less frequently observed.

Bronchitis.—Inflammation of the mucous membrane of the bronchi may be detected in the great majority of fatal cases of pneumonia, and especially of lobular pneumonia, from the earliest slight congestion, with increased secretion, up to entire vascularity, thickening and softening of the mucous membrane, and dilatation of the tubes with purulent or pseudo-membranous matter contained in them. Although the tubes connected with the diseased lobules are almost always affected, yet they are not invariably so, nor is the inflammation limited to these tubes. I have already given Rilliet and Barthéz's conclusions from their experience.

The *pleura* not unfrequently exhibit evidences of ancient or recent inflammation, more frequently the latter. Adhesions, false membranes, vascularity, and effusion, may one or all be observed in these cases of secondary pleuritis. M. Valleix met with them in twenty cases out of one hundred and twenty-three.

The *bronchial glands* are often quite healthy; in other cases, they are enlarged, softened, and red, or they may contain tubercular matter. Their alterations, however, are of no practical importance.

* Lectures on Diseases of Infancy and Childhood, p. 209.

According to M. Barrier, in a small number of cases complicated with *convulsions*, traces of inflammation of the membranes of the brain were detected. In other similar cases, no such evidences were found.

The *intestinal canal* may occasionally exhibit marks of irritation; but although diarrhœa is a very common complication of secondary lobular pneumonia, it rarely, if ever, appears to be owing to inflammation of the mucous membrane, except in cases complicated with muguet or tubercles.

These, I believe, are all the morbid phenomena to be learned by a *post-mortem* investigation. The inquiry still remains as to what relation they bear to each other. Whether they are in truth a chain beginning with bronchitis and terminating at gangrene, or whether there is some difference in kind? Whether bronchitis invariably precedes lobular pneumonia? Whether every form of bronchitis may originate pneumonia, or what form has this peculiar consequence? And why, if this be the result of any species, such an effect should be confined to the period of infancy?

M. Barrier has entered at length into these interesting questions, and has, I think, shown that all varieties of bronchitis do not equally give rise to pneumonia, but only the vesicular or capillary bronchitis; that lobular pneumonia is almost invariably preceded by it, and that capillary bronchitis is more frequent from one to six years than at any other age; and that at this period the anatomical and physiological conditions of the respiratory organs are more favorable for the extension of inflammation to the substance of the lungs. But I will give his conclusions in his own words: "1. The influence of age upon the production of lobular pneumonia is circumscribed within the period of from one to six years. Before and after that age, the disease is rare. 2. The anatomical and physiological conditions of the lung at that age are but secondary in the production of the lobular form of pneumonia. 3. Observation proves that the disease, in its development, is intimately connected with preceding bronchitis. 4. The species of bronchitis which has most influence is that which occupies the smaller tubes, and in which the catarrhal element is the most marked; it might be called catarrh of the small bronchi. 5. Lobular pneumonia is more frequent from one to six years, because this catarrh of the small tubes is most frequent during the same period, and because it calls into action those anatomical and physiological peculiarities which diminish after that age. 6. Inflammation attacks the lobules, either because it is propagated from the bronchi to the lobules by continuity of tissue, or from the stagnation of the mucus in the most dependent bronchial tubes. The obstacle resulting from this, to the penetration of air into the lobules, favors the sanguineous engorgement, as by a species of partial asphyxia. 7. MM. Rilliet and Barthez have not understood all the importance of the bronchitic affection; the opinion of MM. Burnet and De la Berge

appears better founded, but it wants the demonstration into which we have entered. 8. To pretend that it is not demonstrated that bronchitis always precedes pneumonia, and not the contrary, is to put forth a slightly founded objection, and one easily refuted. 9. If lobar pneumonia is rare from one to six years, it is because the causes of this form are rarely in action at this age.”*

Thus, then, it would appear that capillary bronchitis may become the first step towards pneumonia; congestion follows, then hepatization red and gray, abscess, and gangrene. So far the chain seems quite complete; the disease may run through all its stages, or it may, of course, stop at any of them; and experience shows us that the limit between capillary bronchitis and the first stage of pneumonia is very often intact.

But in this series of morbid phenomena, what place is held by that condition of the lung which has been termed *carnification*? Is it the product of inflammation, a modification of hepatization, or is it a quasi-normal condition, as if that portion of lung had been exempt from respiration? Rilliet and Barthez seem inclined to regard it as a kind of termination of pneumonia, or as a chronic pneumonia; and they mention the case of a child, who for a long time presented the signs of pneumonia of the right lung, yet afterwards died of pneumonia of the left lung. On making the autopsy, a considerable carnification of the right lung was found occupying the situation of the auscultatory evidences of pneumonia during life.† M. Barrier admits that it is not quite understood, but that it is probably the consequence of acute inflammation, and “may be considered as a termination of induration.”‡ Hasse, in his *Pathological Anatomy*, regards it as a persistence of the foetal state of the lungs after birth, and distinguishes between this condition and inflammation.

MM. Legendre and Bailly have described this state, and regarding it as passive and asthenic, and not active, and not pathological; a physical modification of the organ, analogous to the condition of the foetal lungs; and they have founded upon this opinion an entirely new view of the disease termed lobular pneumonia.§ This condition of the lung they believe is not the result of inflammation, but that the lung or portions of it collapse, owing to the congested or distended state of the capillaries, and assume this “*état foetal*,” or “*état foetal congestionnel*.” These portions they say differ from hepatized lung, inasmuch as they may be easily distended by air, and so restored to their primary state, whereas the hepatized lung is impermeable to air; but

* Mal. de l'Enfance, vol. i. p. 98.

† Mal. des Enfants, vol. i. p. 74.

‡ Mal. de l'Enfance, vol. i. p. 62.

§ Archives Gén. de Méd., Jan., Feb., and March, 1844.

in this they are opposed to the experience of M. Bouchut. According to these authors, therefore, lobular pneumonia is truly a pulmonary catarrh, answering pretty much to capillary bronchitis, with these collapsed portions of the lung reduced to a condition analogous to the foetal lung, or to that state which has been termed atelectasis.

M. Freidleben differs from this view, and considers that the pneumonia of children runs through the same course as that of adults, but that the lobar pneumonia is more frequent than has been supposed.*

Dr. Fuchs has carried further the theory of Legendre and Bailly. He states that he has never found a condition of the pulmonary parenchyma at all analogous to that observed in the pneumonia of adults, and that the changes are not due to inflammation, but to the cells becoming void of air and atrophied. To this condition he applies the term *apneumatosi*s, and he thus describes the condition of the lung: "The apneumatic lung is in its first stage of a dark color, contains air, swims and crepitates; its compass is less than that of a collapsed lung, and hence single lobules in the apneumatic condition appear as if sunk in the normal tissue. Inflation can be performed. In the second stage, the tissue becomes firm, compact, and void of air; it assumes a uniform character, a small compass, has an even surface on division, and no longer permits of inflation. In the third, it appears as a blue-gray colored tissue with white streaks."† Dr. Fuchs distinguishes between this morbid condition established after respiration and the foetal condition of the lungs before respiration; and whilst he admits that the first stage may come on as a pulmonary catarrh in very young children, in older ones it will have more the character of a determinate inflammation.

Now let me observe that in this question there are two points involved; *first* what is the true nature of that state of the lung which has been called carnification? is it the result of inflammation? is it a modification of hepatization, or is it really a collapse or atrophy of the parenchyma, the result of changes in the neighbouring parts? and *secondly*, if it be non-inflammatory and only a passive apneumatosi and atrophy, is it the principal or the only change observed in lobular pneumonia, and are we to infer that that disease is truly a capillary bronchitis with the addition of (or producing) this collapsed condition of the lung? I do not feel competent to decide these questions, but it appears to me that additional observations are required before we can agree with the original views of MM. Legendre and Bailly, West and Fuchs. I am, however, inclined to believe that bronchitis may result in either lobular pneumonia or atelectasis, but that probably

* Arch. für Physiologische Heilkunde, Part II., 1847.

† Die Bronchitis, der Kinder, 1849.

atelectasis is often mistaken for lobular pneumonia, and further, the condition which has been termed carnification has greater resemblance to the former than to the latter disease. For further details on this subject I would refer my readers to Dr. Willshire's valuable and elaborate essay, *Historic data on Infantile Pneumonia*, in which he has traced the succession of opinions and analysed the views of the different authors with no small learning and ability.*

Causes.—Among the predisposing causes, age appears to exercise a considerable influence. It has been said that primary pneumonia never attacks infants under five years; but Rilliet and Barthez have shown that this is not true. Out of 245 cases, fifty-eight were primary, and of these twenty-four were under five years, *i. e.* five from one to two years, and nineteen from three to five; and thirty-four were beyond five years. Of these fifty-eight cases, fifty-five were lobar pneumonia. M. Valleix mentions that the age of his patients were, of simple pneumonia, from seven to twelve days; of pneumonia with œdema, from two to eight days; and of pneumonia with muguet, from nine to twenty days.† M. Hache, out of 108 autopsies, found pneumonia in seventy-one between the ages of two and five, and in thirty-seven from five to fifteen years of age.‡ M. Barrier, out of twenty cases of lobar pneumonia, met with three before the age of five years, six from five to eight, seven from eight to eleven, and four from eleven to fifteen.§ Of sixty-one cases of lobular pneumonia, forty-five were between two and five years, and sixteen from five to sixteen. In 203 cases, Rilliet and Barthez found lobular pneumonia between the ages of one and five and a half in 160, and from six to fifteen in forty-three cases. Thus, both primary and secondary, both lobar and lobular pneumonia, may occur from birth up to fifteen years; both are more frequent before five than after, but especially lobular pneumonia.

The predominance of the male sex is more marked in lobar than in lobular, in primary than in secondary pneumonia. Of twenty-four cases of primary lobar pneumonia, referred to by Rilliet and Barthez, nineteen were males and five females; and of forty-five of secondary pneumonia (generally lobular), twenty-seven were males and eighteen females. Of sixteen cases of lobar pneumonia, related by Dr. Gerhard and M. Ruz, twelve were males and four females. Ten out of fifteen of M. Valleix's cases were males. Of M. Vernon's 114 cases, there was an equal number of males and females. Of 104 cases mentioned by Dr. Condie, sixty were boys and forty-four girls. Of 1615 deaths from pneumonia, occurring in Philadelphia during the ten

* British and Foreign Med. Chir. Rev. Oct. 1853, p. 514.

† Clinique des Mal. des Enfants, p. 173.

‡ Mal. des Enfants, p. 478.

§ Mal. de l'Enfance, vol. i. p. 187.

years preceding 1845, 872 were in boys and 743 in girls.* According to M. Barrier, sex asserts but little influence upon lobular pneumonia.

Temperament and constitution, doubtless, exercise great influence in the production of the disease; those of a lymphatic temperament and of an enfeebled and broken-down constitution being peculiarly liable to secondary and especially lobular pneumonia. Of 245 cases related by Rilliet and Barthez, only fifty-eight were stout and well when attacked; and in fifty-five of these fifty-eight, the form of disease was lobar pneumonia; in a great majority of the remainder, it was lobular pneumonia. Dr. Stewart mentions an hereditary predisposition in some families to the disease.† M. De la Berge and M. Leger state that the disease is more frequent in spring and autumn; Dr. Gerhard, that primary pneumonia prevails in the months of April and May; Rilliet and Barthez mention that from April to September, 1837, only six cases of primary pneumonia were received into hospital, whereas, in the same months of 1840, twenty-two were admitted. During the six summer months of the year referred to by M. Barrier, fifty-six cases of pneumonia occurred. So that we cannot regard the summer as conferring immunity from this disease; nevertheless, I have no doubt that in this country it will be found far more frequent during the winter. In this city, I have generally met with more cases from December to the end of March than at any other period of the year. This is confirmed by the opinion of Dr. Stewart and others; and Dr. Hood has quoted from Mr. Chadwick the following details: In winter there were 3326 cases of pneumonia; in spring, 2454; in summer, 1827; and in autumn, 3600. No doubt that cold is the most frequent exciting cause among children; it can hardly affect young infants so much, but yet they are often exposed. Change of room, change of garments, exposure to draughts of air, going out in unsuitable weather, the prevalence of damp, and certain winds, all may excite the disease even in the most healthy, how much more in those already weakened by disease.

By certain French writers, much stress has been laid upon the effect of a prolonged dorsal decubitus in the production of the disease among the children in the *Hôpital des Enfants* at Paris. MM. Billard, Denis, De Commercey, Leger, Rilliet and Barthez, all attribute more or less influence to this cause; but it seems probable that at least as much is owing to other causes acting at the same time.

Pneumonia may also prevail epidemically, or, what is more frequent in this country, it may form part, as it were, of the epidemic influenza;

* Diseases of Children, p. 312.

† Diseases of Children, p. 50.

sometimes the bronchitic, at others the pneumonic element prevailing, as I noticed in the last chapter. Dr. Cheyne mentions that it prevailed epidemically every winter, about Leith—in the years 1802, 3, 4, and 8, he had seldom less than from 15 to 30 cases under his care.*

Dr. West has given definite numbers for a fact which all must have experienced with regard to pneumonia, I mean the great liability of those who have once suffered from it to be again attacked. Of seventy-eight cases which came under his care for inflammation of the lungs, "thirty-one were stated to have had previous attacks of the disease; twenty-one, once; four twice; two four times; and four were said to have had it several times, though the exact number of seizures was not mentioned. Of these thirty-one, ten were under two years of age; ten, between two and three; and the remaining eleven, between three and six."†

We must now examine as to what disease predisposes to pneumonia, as a secondary affection, and I shall avail myself of a table drawn up by Dr. West. It concerns 166 cases, and of these, "In sixty-five cases, the respiratory organs presented no sign of recent inflammation, the children having died of the following diseases: Of trismus, three; meningeal apoplexy, two; cerebral congestion, one; inflammation of the brain, one; acute hydrocephalus, twenty-five; cerebro-spinal arachnitis, three; chronic hydrocephalus, one; tubercle of the brain, three; cancer of the brain, one; croup, two; laryngismus stridulus, two; phthisis, five; anasarca, one; anasarca after scarlet fever, one; diarrhoea, four; atrophy, three; congenital syphilis, one; cancrum oris, two; lumbar abscess, one; scrofulous disease of the vertebræ, one; fungus hæmatodes of the liver, one; of the kidney one. In fourteen cases, though there was no sign of inflammation, yet a more or less considerable portion of the lung was collapsed, but restored by inflation to its natural condition, or presented the physical characters of collapsed lung in so marked a degree as to preclude the possibility of error. The causes of death in these fourteen cases were:—congenital atelectasis, one; induration of the cellular tissue, one; convulsions, one; meningitis of the convexity of the brain, one; congestion of the brain occurring in the course of whooping-cough, one; tubercle of the brain, one; atrophy of one hemisphere of the cerebellum, one; atrophy, five; laryngismus stridulus, one; fungus hæmatodes of the kidney, one. In forty-seven of the above seventy-nine cases, the pulmonary tissue was quite free from tubercle. In twenty-two, the lungs contained crude tubercle only; in three, some softened tubercles. In the remaining eighty-seven cases, either the pulmonary substance, the

* Pathology of Larynx and Bronchia, p. 187.

† Lectures on Diseases of Children, p. 180, *note*.

bronchi, or the pleura, showed signs of recent inflammation. The pleura was mainly affected in twelve of these cases, its inflammation having been idiopathic only in four. In six of these cases the lung was inflamed; in the other six merely compressed. In nineteen cases the inflammation was chiefly or entirely confined to the bronchi, and in six of these the inflammation was idiopathic. In fifty-six cases, pneumonia prevailed, which was idiopathic in seventeen, and secondary in forty-five instances. In the fifty-nine cases of acute secondary inflammation of the lungs or bronchi, the patients had suffered from the following diseases: Hooping-cough, sixteen; phthisis, seven; acute pleurisy, six; measles, five; croup, three; scarlatina, three; diarrhœa three; acute hydrocephalus, three; croup, consequent on measles, two; remittent fever, two; acute meningitis, two; chronic bronchitis, one; coryza, one; anasarca after scarlatina, one; cancrum oris after remittent fever, one; acute rheumatism, one; convulsions, one. Of the whole eighty-seven cases; in sixty-nine the pulmonary tissue was free from tubercle; in ten it contained tubercle, unsoftened; in five tubercle softened; in three, tubercular cavities."* This valuable summary affords both negative and positive information; negative as to the disease of which pneumonia is not a frequent complication, and positive, as to those in the course of which it occurs as a secondary attack. However, as Dr. West observes, it would require a large number of cases to enable us to draw any stringent conclusions. So far as it goes it confirms pretty exactly what I have said previously.

According to M. Barrier, of sixteen cases, thirteen were connected with acute catarrh, and three with chronic catarrh, occurring in the course of measles; in two, with scarlatina; in three, but obscurely, with small pox; in ten, with bronchial catarrh; in twelve, with bronchial and intestinal catarrh; in nine, with hooping-cough; in one, with typhoid fever. There can be little doubt that lobular pneumonia arises most frequently in the course of the eruptive fevers, bronchitis, and hooping-cough; and knowing this, it is our duty to be constantly on the watch, that we may detect the earliest symptom.

Diagnosis.—The diagnosis of the lobar form is less difficult than of lobular pneumonia; we have the short cough, pain in the chest, hurried breathing, dulness on percussion, crepitant râle, and fever. In lobular pneumonia, the cough, dyspnœa, and fever, are much the same, the pain is less, and the dulness on percussion not so perceptible in the mammelonated form of the disease. In the generalized form we shall have less difficulty, as the dulness is marked, and the crepitant or sub-crepitant râle very evident.

1. The differential diagnosis between this disease and *bronchitis* will depend very much upon the clearness on percussion, the presence of

* Lectures on Diseases of Infancy and Childhood, p. 181.

mucous and sibilant râles, the absence of the crepitating or sub-crepitating râles. In the latter disease, the face has generally a purplish tinge, the cough has more of a kink, the respiration is more labored, and perhaps less hurried.

2. From *pleurisy*. In both, of course, there is dulness on percussion, spreading rapidly; but in general there is less constitutional and local disturbance in pleurisy, the cough is not so frequent, the pulse not so quick, nor is there the same hurry of breathing. The pain in pleurisy, also, is more distinct, severe, and occupies a different situation. The distinguishing characteristic râles of pneumonia are, of course, altogether absent, and the vocal sound may be different.

3. There may be great difficulty in distinguishing pneumonia from a sudden infiltration of *tubercles*. M. Grisolle remarks: "A child has a hot skin, violent fever, dulness, with bronchial respiration under one of the clavicles, and we have no information as to its previous history. Is it certain, then, as Rilliet and Barthez ask, that the child has pneumonia? These physicians have often seen this question answered in the affirmative, and treated accordingly, and yet the autopsy has proved that these symptoms depended upon a tubercular infiltration of the lung. "In such cases," they remark, "we must observe the intensity of the fever, and especially the cause of the disease; if the stethoscopic phenomena persist, notwithstanding the diminution of the general symptoms, it is probable that this persistence is the consequence of the tubercles. I am completely of the opinion, but this does not prove that the fever and bronchial respiration may not have been owing to a kind of pneumonia."*

Prognosis.—Primary pneumonia, whether lobar or lobular, is much less fatal than the secondary disease. Lobar pneumonia (perhaps because more frequently primary) is less fatal than lobular, and uncomplicated much less fatal than when complicated. Secondary lobular pneumonia is, of course, frequently fatal, partly owing to the disease itself, but much more to the effects of the primary malady, and the inability of the child's constitution to resist the inroads of a new disease. Of twenty-one cases of primary pneumonia, Rilliet and Barthez state that twenty-one were cured. Of twenty cases of lobar pneumonia, according to M. Barrier, but one died; whilst, of sixty-one cases of lobular pneumonia, forty-eight died, eight were completely, and five incompletely cured.

Treatment.—Before entering upon the treatment of any case of pneumonia, we should carefully satisfy ourselves whether it be primary or secondary, whether simple or complicated, and of the exact state of any other existing malady, whether primary or secondary, and of the state of the patient's constitution, its strength or weakness, the injury already

* *Traité de la Pneumonie*, p, 513.

done to it, and the probable powers of endurance remaining. This done, we may select and apportion the remedies at our command, which, although few and simple, do yet require judgment in their application. The principal remedies are bleeding, tartar emetic, calomel, counter-irritation, and stimulants. It will be also essential to remove all existing causes of irritation, and amongst these the most influential is probably dentition. Whether it may give rise to pneumonia or not, certain it is that it will increase and perpetuate the inflammatory action. In all children, therefore, at the age of teething, the gums should be examined, and if they be at all swollen or inflamed, they should be divided thoroughly.

Bleeding, either general or local, is one of our most powerful means for arresting inflammation of the lungs. Some of the continental writers object to it, as weakening the patient, but, as Dr. West observes, this opinion, being formed from the cases of secondary pneumonia met with in the hospitals, cannot be a guide to us in general practice. The great majority of British and American practitioners agree in recommending that at the commencement of pneumonia blood should be freely abstracted, according to the age and strength of the patient, and that, if it be necessary, owing to the severity and obstinacy of the disease, it should be repeated once or twice. The blood may be taken from the arm of the child, if it be old enough, or by cupping or leeches to the chest, hand, or foot. I prefer leeches to the chest in infants, because they are more manageable, and less likely to frighten a young child than cupping; and I think they produce greater effect when applied to the chest than to more distant parts.

Both lobar and lobular pneumonia may be thus treated freely when primary, but when secondary it will be necessary in all cases to modify the amount taken; and in some cases, when the child is much broken down and exhausted, it would be very imprudent to take blood at all. In such cases we must have recourse to counter-irritation, calomel, or perhaps tartar emetic. "When an abundant effusion has taken place into the bronchia," Dr. Cuming observes, in his excellent paper, "and when, as generally happens, this state is combined with more or less of collapse of the system, the abstraction of even a very trifling quantity of blood might be attended with a fatal prostration."*

When the leeches have ceased bleeding, a large, soft, warm poultice of bread and milk or linseed-meal should be constantly applied to the part affected. I have found nothing afford such immediate comfort and relief to infants and children. It may be removed when counter-irritants are to be applied, and then replaced. It soothes the sensations, relieves the aching pain, quickens the action of the counter irritants, and promotes expectoration.

Tartar Emetic.—No physician is ignorant of the extreme value

* Trans. of Association, vol. v. p. 49.

of tartarized antimony in the treatment of pneumonia in the adult. It is not less valuable with children, but it requires a little more watchfulness and caution, as it sometimes produces very alarming depression. After bleeding, in all primary cases, it will be right to give it a fair trial, and, if it acts kindly, to continue it as long as we find necessary. The dose must be graduated according to the age of the child, the object being rather to produce nausea than vomiting. It will often be found, however, that a child will bear a larger dose than we might suppose, and that, although the first dose may cause vomiting, the subsequent ones will not. Or we may commence by producing vomiting, and then diminish the dose, so as to occasion nausea merely. Dr. West recommends "one-eighth of a grain every ten minutes, till vomiting is produced, in the case of a child two years old, and continued every hour or two afterwards, for twenty-four or thirty-six hours." One grain of the salt to two ounces of fluid for a child under two years, and two grains for a child of four or five, will form a mixture of which a teaspoonful may be taken every two, three, or four hours. The following mixture answers the purpose, and, besides being very palatable, will probably check the tendency of the tartar emetic to act on the bowels:—

R.—Miss. amygdal. ʒij.

Antim. tartarizati, gr. j. vel. ij.

Syr. papav. alb. ʒij.—M.

A teaspoonful to be given every three or four hours.

But in secondary pneumonia, especially when the patient is much reduced, or when the stomach and intestinal canal have been affected, we must be very cautious how we give tartar emetic. If used at all, it must be given in much smaller doses, at the same or longer intervals, or we may seriously aggravate the patient's weakness, or add to the intestinal irritation. If we cannot give it, our great reliance must then be upon calomel, counter-irritation, and stimulants.

Calomel.—It is rarely advisable or necessary to give calomel so long as we are employing tartar emetic; but when a change becomes desirable, or for any reason we are afraid to give the latter medicine, we must have recourse to calomel. Of less immediate value, perhaps, than tartar emetic, it is still of great importance, and possesses great control over inflammatory action. It may be given in doses varying from one-fourth or one-third of a grain to a grain, every three, four, or six hours, guarded by a little Dover's powder, or the powder of chalk with opium. In secondary pneumonia it will still be found of great use, provided there be no diarrhœa, or provided we can so guard it as to prevent it acting upon the bowels. Sometimes the hyd. c. cretæ is better borne than calomel, though less effective. If we cannot give it, on account of the state of the bowels, we may use mercurial inunction,

which has more effect with children than adults, from the greater sensitiveness of their skin. Although salivation or ulceration of the gums are very rare in children under five years of age, yet, as they do occasionally occur, it is necessary to watch the child, and to stop the mercury on the first sign of tenderness of these parts.

Counter-irritation.—I have always derived great benefit from blisters in pneumonia, provided they were not applied too soon. We ought not to apply them during the height of the fever, until after having recourse to bleeding and tartar emetic, except in cases in which these remedies have not been suitable. But after bleeding and tartar emetic have lowered the febrile excitement, even though the pulse still remains quicker than natural, a moderate-sized blister, applied for a few hours only over the seat of the disease, will seldom fail to afford relief. It is better to apply it for a short time, and allow it to heal, and then apply another near to the former, than to cover the chest with one at once. In cases where more active measures are inadmissible, a succession of blisters must be substituted, care being taken that they are not applied too long, so as to give rise to ulceration. Dr. West speaks highly of stimulating liniments, others of mustard plasters; but, though useful, they are far less efficacious than blisters, and if the blister be carefully attended, I have not found any mischief result.

When we do not give tartar emetic, or after we discontinue it, it will be necessary to give some cough mixture, and I have found one composed of equal parts of decoction of senega and water, with syrup of smilax and a little ipecacuanha wine, of great use, to which we may add the carbonate of ammonia towards the end of the disease, as thus:—

R.—Decoct. senegæ, ʒij.
 Carb. ammon. ʒj. to ʒss.
 Vini ipecac. ʒss.
 Syr. smilac. asp. ʒiv.—M.
 Aquæ, ʒij.

A teaspoonful every three or four hours.

Stimulants.—These are only required in cachectic cases, when the constitution has been broken down, or towards the termination of the disease, when the pulse has become slower, and the patient is weak. Ammonia is probably the best we can employ, and it may be given in almond milk, in doses of from half a grain to two grains every three or four hours, or it may be combined with the expectorant mixture. Under similar circumstances it may be necessary to give wine-whey, or plain wine and water.

A warm bath at the beginning of the disease, with fomentations to the feet occasionally, will be both soothing to the patient and beneficial.

The diet in primary pneumonia must be low and spare, but towards

the termination, and in all cases of secondary pneumonia, we shall find it necessary to support the strength by chicken broth, beef tea, &c.

The bowels must be kept free, and it is well not to place the child always in one position in bed.

During convalescence, the utmost caution and care must be exercised. The child should be confined to one room, or to two of the same temperature. For some time the clothing should be warm, with a light flannel waistcoat next the skin.

For the treatment of the complications, I must refer the reader to the chapter on those diseases, merely observing that, although they much increase the danger, they often diminish our power of active treatment, and in some cases (as intestinal irritation) exclude some of the most valuable remedies for pneumonia.

CHAPTER VIII.

PLEURISY.—PLEURITIS.

INFLAMMATION of the pleura, or pleuritis, may attack children of all ages, although its comparative frequency varies a good deal. Of 4012 patients treated at the London Infirmary for Children during the year 1846, only three cases of pleurisy* were noted; but out of 4158 admitted in 1845 to the Royal Institution for Diseases of Children in the district of Wieden, Vienna, there were seventy-six cases of the disease.† “In London, during the year 1843–44, the deaths from pleurisy in children under fifteen years of age amounted to one-sixth of the whole number of deaths from the same cause;‡ and of twenty-five

* Report of the Royal Infirmary for the year 1846.

† *Jahrbericht über die Leistungen des Unentzeldlichen Kinderkranken Instituts*, &c.

‡ Sixth Annual Report of Registrar-General.

deaths at all ages, from pleurisy, registered in the month of January, 1847,* eleven occurred under the age of fifteen years."† M. Billard‡ states that he has found it more common than one would have expected; and, on the other hand, M. Valleix considers it rather rare.§ Of 3392 autopsies of children under two years old, M. Baron found pleurisy in 205, or six per cent.; and of 181 autopsies of children from 2 to 15, the pleura of 158, or eighty-seven per cent. was affected.|| Dr. Eberle regards it as more common than is supposed. Mr. Crisp met with six cases of pleurisy in forty-one autopsies of children under two years of age.¶ Dr. Battersby has recorded six cases of simple or complicated pleurisy.** MM. Rilliet and Barthez have recorded eighty-five cases of pleurisy under fifteen years of age. M. Hache states that he has met traces of pleurisy in eighty-one cases out of 194 *post-mortem* examinations; and M. Barrier has given fourteen cases.

From these facts we may infer that pleurisy is not so rare a disease in children as many have supposed. Perhaps, indeed, this supposition may be the cause why so little attention was paid to the subject until lately. It is only recently that any very accurate researches have been undertaken into the distinction between pneumonia and pleurisy in children. We are indebted to Meissner, Henke, and Heyfelder†† in Germany; to Billard, Constant,‡‡ Baron,§§ Berton,||| Rilliet and Barthez, and Barrier, in France; to Crisp,¶¶ West, and Battersby,*† in these countries; and to Steward, Eberle, Condie, and Meigs, in America, for the principal information we possess.

Symptoms.—Pleurisy may be either primary or secondary, simple or complicated, acute or chronic. It will be found to be modified somewhat in early infancy. Rilliet and Barthez have also described the disease occurring in children of a broken down constitution under the name *cachectic pleurisy*.

I. *Primary Acute Pleurisy* commences generally with depression and loss of appetite, occasional vomiting, weakness, slight cough, and a degree of fever, which subsides after a time. In some cases there are

* Weekly Tables of Births, &c., January, 1847.

† Dr. Battersby, Dublin Journal, Nov. 1847, p. 349.

‡ Mal. des Enfants Nouveaux-nés, p. 529.

§ Clinique des Mal. des Enfants, p. 198.

|| De la Pleuresie dans l'Enfance.

¶ London Med. Gaz., Dec. 25, 1846.

** Dublin Journal, November, 1857.

†† Archives, third series, vol. v. p. 59.

‡‡ Gazette Med., 1836, p. 265. Lancette Française, 1837, p. 146.

§§ Thesis, 1841.

||| Traité des Mal. des Enfants.

¶¶ London Med. Gazette, Dec. 25, 1846.

*† Dublin Journal, Nov. 1847, p. 348.

rigors; in all the child seems ill, uneasy, and cross. In other cases the symptoms which usher in the disease are more alarming, and point rather to the head than the chest. The child is seized with vomiting, attended with fever and intense headache; it either cries aloud or is delirious at night, or screams much in its sleep, and, when morning comes, complains much of its head, but denies having any pain whatever in its chest, while the short cough and hurried breathing may be thought to be merely the result of the cerebral disturbance. Early in the complaint, the child complains of pain in the side (generally the left) if it be old enough; in young children it is not always easy to ascertain this, except, perhaps, by the cry, when the side is percussed. The cough soon becomes troublesome; it is short, dry, and interrupted, the respiration hurried and short, especially on lying down, because of the pain caused by deep breathing. Rilliet and Barthez consider the dyspnoea to be less than in pneumonia. "Respiration," says Dr. Condie, "is performed chiefly by the action of the abdominal muscles and diaphragm, the motions of the chest being instinctively restrained by the patient, in consequence of the pain attendant upon the elevation of the ribs; sometimes each inspiration gives rise to a sharp cry or moan, and an expression of countenance indicative of suffering."* In the majority of these cases there is no expectoration, and when present, it is not peculiar.

Mr. Crisp has noticed the throwing back of the head, and fixing it steadily there, as a peculiarity in pleuritis, and the distress occasioned by an attempt to straighten it.† Dr. Battersby states that he has long observed this, and he thinks it arises "from an instinctive effort to avoid painful motion of the chest, by fixing the ribs, and giving full play to the abdominal respiration. This position of the head in pleuritis may be distinguished from that attending cerebro-spinal arachnitis, or other affections of the nervous centres, by all change of posture being followed by great uneasiness and screaming, while in the latter the infant is not so restless, nor crying so constantly, especially when moved or held erect, as in pleuritis."‡ This fixing of the head backward occurs in pericarditis also, and in other affections; and I must confess I have hitherto been unable to satisfy myself of its exact value as a symptom.

The face is generally pale and anxious, with considerable contraction of the respiratory muscles of the face, and action of the alæ nasi, especially at the commencement. The tongue is moist, white, and loaded, the appetite impaired or lost. Vomiting occasionally occurs; and the bowels, at first unaffected, are often subsequently attacked by

* Diseases of Children, p. 290.

† London Med. Gazette, Dec. 25, 1846, p. 1104.

‡ Dublin Journal, Nov., 1847, p. 371.

diarrhœa. The decubitus is of little or no value in young children, as they generally lie as they are placed in bed. In older children, one side or the other will afford more ease. Dr. Stokes says on the healthy side in the beginning and the diseased side towards the end. The pulse is very quick at first, from 110 to 120, but it frequently subsides after a time to somewhat above the natural standard. At first, too, there is smart fever, with heat of skin, thirst, &c.; but this very commonly diminishes.

Now let us examine into the physical signs of pleurisy. At an early stage of the disease, we find the respiratory murmur enfeebled, and gradually retreating upwards as the effusion increases. Then we may detect *bronchial respiration*, generally constant, but occasionally disappearing and returning at intervals, owing, M. Bouchut thinks, either to the short inspirations or the interruption to the passage of air offered by the accumulation of mucus. MM. Rilliet and Barthez class this among the earliest symptoms of pleurisy; they found it present on the first, second, or third day. The sound in pleurisy is peculiar and metallic in its tone, differing in that and in its progress and duration from the bronchial souffle of pneumonia. Generally speaking, it is heard posteriorly, and at an early period, over the whole upper portion; at a later period, chiefly about the inferior angle of the scapula or the interscapular space. It lasts for some little time, and then disappears in the course of one, two, or three days; or it may persist longer, and be audible either during inspiration or during both inspiration and expiration. When the case is simple and the termination fatal, it may be heard until the end. Rilliet and Barthez heard it after the twenty-seventh day, in a child who died on the twenty-eighth. But when the disease subsides, the bronchial souffle is superseded by feeble respiratory murmur, more rarely by frottement, and sometimes by pure respiration. In some few cases, this peculiar characteristic is absent. Rilliet and Barthez explain the frequency of the bronchial souffle by, 1. The comparatively greater narrowness of the chest in children than in adults; 2. The greater number of respiratory movements; and 3. In certain cases, the small amount of effusion.*

Frottement, which is so characteristic a symptom of the early stage of pleurisy in adults, is comparatively rare in children. Both MM. Baron and Rilliet and Barthez agree that, though rare at the beginning, it is often present during the resorption of the effused fluid. The latter authors have never heard it in children under five years of age. Mr. Crisp, however, speaks of its occurrence in all his cases.

Bronchophony and *egophony* occasionally accompany the pleurisy of children; the latter generally in the early stage in acute cases. It is heard ordinarily at the posterior and inferior part of the chest. It is

* Mal. des Enfants. vol. i. p. 149.

more distinct in older children, though audible at all ages. When it is not present in very young children, there is generally a peculiar resonance of the voice.

Percussion affords evidence of great value at the commencement of the disease. The dulness may be somewhat obscure, but as the disease advances it becomes more marked, keeping pace with the feebleness of respiration and the bronchial souffle, until at length the side of the chest becomes absolutely dull. This lasts until the disease begins to subside, and marks not only the locality but the duration, according to its persistence. By degrees, as the bronchial respiration is replaced by the feeble or pure respiration, the chest becomes more sonorous, and at length perfectly clear. As in the adult, change of position will modify the results of percussion as well as of auscultation.

Taupin,* Baron, Rilliet and Barthez, Trousseau, and Bouchut, lay great stress on the absence of *vibration* when the effusion is considerable, as was first noticed by Reynaud, Hudson, and Stokes. M. Bouchut conceives that this sign alone distinguishes it from all other inflammations. If the hand be placed on the chest of a healthy person, we feel a remarkable vibration both of the respiration and voice; but if there be effusion, there will be no vibration perceptible, either from the respiration or the voice; and this is exactly the opposite of what we find in pneumonia. Dr. Stokes, however, mentions that it is inapplicable to many cases of boys and girls, before the change of voice, on account of the natural feebleness of the vocal vibrations.† Dr. Battersby thinks it impossible to detect this vibration before the eighth year. On inspection of the chest, the affected side appears immovable during respiration; there is no expansion, no movement of the ribs.

The measurement of the chest is by no means easy with infants and young children, nor does it yield much information early in the complaint, nor when it runs its course rapidly. When the attack is prolonged several weeks, there is a notable difference in the two sides of the chest, in proportion to the effusion. The affected side is enlarged, the intercostal spaces are raised to the level of the ribs, or even protruded so that the ribs are not quite visible, and neither the sternum nor spine occupies the centre of the chest. When the fluid is absorbed, the affected side is contracted, but not to any great extent. It is very remarkable that neither Baron, Rilliet and Barthez, nor Barrier, have met with effusion so considerable as to *displace the heart*. M. Heyfelder has observed in chronic pleurisy considerable deformity, with curvature of the spine, and a displacement of the heart from its ordi-

* Recherches sur le Diagnostique, des Mal. de Poitrine chez les Enfants.

† Diseases of the chest, p. 498.

nary position. Dr. Battersby has related four such cases,* and I have seen several.

Thus, although the rational signs of pleurisy are not very clear, we can hardly mistake the physical signs. In the earlier stage, feebleness of respiration, succeeded by the bronchial souffle, with marked and increasing dulness on percussion, absence of vibration in the side affected, perhaps egophony or vocal resonance, and at a later period, if the effusion be great, dilatation of the chest and dislocation of the heart.

When pleurisy attacks *an infant at the breast*, the symptoms are necessarily more obscure, and the physical signs less readily ascertained; there is fever, quick breathing, and cough, but whether pain or not it is not easy to determine, unless we infer it from the child crying when the cough is troublesome. The infant is evidently very ill; it sucks less eagerly, is fretful and heavy, and as the disease advances it loses its appetite; is sometimes attacked by diarrhoea; the fever is occasionally remittent, with nocturnal exacerbations; the respiration is quick, hurried, and panting, and the cough frequent.

The usual physical signs are present; feeble respiration, bronchial respiration, dulness on percussion, except just at the beginning, and the absence of vibration when the hand is placed on the affected side.

II. *Acute Secondary Pleurisy* may occur in the course of any other disease, but it seems peculiarly apt to develop itself in the progress of pneumonia, either from contiguity of structure or in consequence of the opening of an abscess into the pleural cavity.

The symptoms which mark its commencement vary a good deal; it may begin in young children by convulsions or by sudden orthopnoea. More frequently it commences with sudden and severe pain, with increased difficulty of breathing, and cough. The hurry of breathing and the rapidity of the pulse are often very great. The physical signs are somewhat modified, and in the case of pleurisy supervening on pneumonia have been thus stated by Rilliet and Barthez: "When effusion is superadded to pneumonia, it happens occasionally, but very rarely, that there is a complete absence of the respiratory murmur instead of bronchial respiration. Ordinarily the souffle is *considerably increased in intensity*; sometimes it has even a cavernous tone, and if there be any mucus agitated by the rush of air, giving rise to a râle, one might mistake so far as to fancy that a cavity had been formed in the lung. At the same time the voice sounds so shrill that it is literally painful to the ear. If we percuss the chest, the dulness is absolute, whereas, a short time before, it was but relatively dull. We lay it down, then, as a principle, that *when a pleuritic effusion supervenes in a child laboring under hepatization of the posterior part of the lung, all the abnor-*

* Dublin Journal, November, 1847, p. 353.

mal sounds which were perceptible in the diseased part are considerably exaggerated, and the resonance on percussion lost."* This peculiarity, however, is not observable in all cases, it requires for its production that the hepatization should be sufficient to prevent the compression of the lung; so that if a complete absence of the respiratory murmur succeeds to the symptoms of pneumonia, we may infer that the hepatization is neither extensive nor profound; but on the other hand, if the souffle, the resonance of the voice, and the dulness, are suddenly exaggerated, it is an evidence that the pneumonia was deep and extensive.

Very frequently the progress of the disease is much more rapid than in simple pleurisy; in other cases the duration may be more or less prolonged. In favorable cases the symptoms gradually diminish, both locally and generally; but in fatal cases they increase, and the smallness and feebleness of the pulse, the coldness of the extremities, paleness of face, and general sinking of the powers of life, warn us of the final result. But either primary or secondary pleurisy may pass into the chronic form.

III. *Chronic Pleurisy* may either be the issue of an acute attack, or the disease may assume this form from the beginning. In the former case the symptoms gradually diminish to a certain point, but not beyond, the fever continuing more or less, but especially in the evening. In the second, the symptoms are much more indefinite, and steal on insidiously. There may be little or no fever, the pain is uncertain, and not limited to one particular spot, or there may be none at all. The cough is slight, and at first there is but little distress in respiration; the effusion, however, increases, the respiratory murmur is feeble or absent; there is occasionally the bronchial souffle, with marked dulness on percussion, and absence of vibration. On inspecting the chest when the effusion is considerable, we may perceive the enlargement of the side and the consequent deformity, the protrusion of the intercostal spaces, and perhaps the displacement of the heart. Heyfelder has remarked that the child lies on the affected side, which is slightly œdematous, with its knees drawn up, in a crouching position. The child meantime becomes emaciated and pale; the evening exacerbations are marked, followed by sweating during the night; the appetite is lost, and at the end of some weeks or months the child sinks, quite worn out. It is quite possible, however, that the child may be saved, either by the absorption of the effusion, its removal by expectoration, or by a surgical operation.

Complications.—These are not frequent; Rilliet and Barthez have rarely seen any that could be fairly connected with the pleuritic inflammation.

* Mal. des Enfants, vol. i. p. 152.

Convulsions sometimes usher in the attack, and occasionally there are some irregular cerebral symptoms connected with secondary pleurisy. Rilliet and Barthez mention a case of meningitis which occurred in the progress of pleurisy, which itself was developed during the existence of Bright's disease, but upon which of the two the meningitis depended it would be hard to say.

Pneumonia may itself complicate primary pleuritis; it is not very uncommon to find a thin layer of the pulmonary tissue inflamed beneath the serous membrane.

Terminations.—*Acute primary or secondary pleurisy* may terminate,—1. In resolution, with gradual subsidence of the inflammation, and re-absorption of the effusion; 2. In absorption of the fluid by the lungs, and its vicarious expectoration from those organs; 3. In chronic pleurisy; 4. *Chronic pleurisy* may terminate by re-absorption of the fluid; 5. By its vicarious expectoration; and 6. By a spontaneous opening through the parietes of the chest, as in the case related by Dr. Battersby.

Morbid Anatomy.—In the majority of cases, the pleura of the side affected is found smooth, pale, and semi-transparent; in others, regularly and finely injected, or exhibiting patches of ecchymosis, especially underneath the false membranes. In one case, Rilliet and Barthez found the pleura beneath the false membrane very vascular and softened, and in another case thickened. The sub-serous tissue is occasionally vascular.

More or less fluid is found in the pleural sac; sometimes simple or bloody serum, with flocculi of lymph; sometimes the fluid is thick, yellow, and puriform, or of an intermediate character. The colorless, viscid, stringy fluid which we find occasionally is regarded by Rilliet and Barthez as the result of inflammation. When there is a communication with the external air, the effusion may acquire a fetid odor. In most cases the effusion naturally occupies the most depending position, rising in the serous sac according to its amount; in other cases, as in adults, it is contained in sacs formed either by old adhesions or recent false membranes.

The pleura costalis and pleura pulmonalis are frequently covered with false membranes of varying size and thickness. Sometimes they are soft, and deposited in small patches; or they may be extensive, but very thin; or several of their laminae may be super-imposed, forming a thick, solid layer. They are generally of a whitish-yellow color, but near the surface of the lung we find a tinge of red. The free surface is irregular, unequal, occasionally nodulated, and sometimes connected with the opposite pseudo-membranous layer by bands. When the disease is of old standing, the fluid portion becomes absorbed, the false membranes become dry and thin, forming adhesions, intimate or loose, between the different portions of the opposite surfaces. Laennec has admirably described the change from false membranes to adhesions, and

to his work I must refer the reader, as the process is essentially the same in adults and children.

When the pleurisy is simple, the lung is pressed back either totally or partially to the vertebral column, its volume is diminished, and its substance is flaccid, smooth when cut, impenetrable to the finger, presenting that condition which has received the name of carnification. The extent of this change will, of course, correspond to the amount of the effusion. But in other cases the lower lobe of the lung is solid, heavy, and but slightly pressed back to the vertebral column. Its substance resembles the lung in a state of hepatization, but is firmer and less penetrable by the finger, and on pressure less sanguinolent fluid escapes. In such cases it is pretty certain that the hepatization preceded the effusion; the lung, having become more solid, could not be compressed by the fluid beyond a certain point, but still it is more condensed by the pressure than it would otherwise have been. Rilliet and Barthez have attempted to point out the anatomical characters when the pneumonia succeeds to the effusion, but without much success. In the case they mention the superior lobe was carnified and compressed, the inferior exhibited the different stages of pneumonia, was friable, sank in water, and on pressure no sanious fluid escaped.

The same authors observe that simple pleurisy is more frequently unilateral than double, and rather more common on the right side than the left; and that when complicated with pneumonia it is still more frequently unilateral, but that the left side is more commonly affected. Taking all the cases, they found that pleurisy, complicated or simple, was more frequently unilateral than double, and more common on the left side than the right. Thus, in eighty-five cases, the disease affected the right lung only in thirty, the left in thirty-eight, and both in seventeen; but of twenty-one cases of simple pleurisy, the right side alone was affected in eleven, the left in eight, and both sides in two cases. M. Baron has arrived at nearly the same conclusion. All M. Barrier's fourteen cases were unilateral except two; in twelve, it was seven times on the right and five times on the left side. In six simple cases, it was five times on the right, and once on the left; in six cases complicated with pneumonia, it was four times on the left, and twice on the right. Dr. Battersby rather agrees with Dr. Copland, that "pleurisy in every form, in children as well as in adults, is much more frequent in the left than in the right side of the chest;" and this is in conformity with my own observations.

The most frequent morbid lesion is the false membrane; the next, the turbid serum; and least common, pus. The former is often the only lesion. The quantity of these products of inflammation varies, but it is seldom great. Rilliet and Barthez, Baron, and Barrier, state that the effusion is generally very inconsiderable, and in none of their cases was it sufficient to cause displacement of the heart. M. Heyfelder mentions cases from which six pints (*chopins*) of pus were removed by operation. Dr. Battersby has related several cases in which

the effusion was sufficient to dislocate the heart from its usual situation, and I have seen three or four.

As to the adhesions, Rilliet and Barthez remark that in the great majority of cases they are parieto-pulmonary, next, costo-pulmonary, and lastly, interlobular. They met with costal false membranes alone in one case, interlobular in four, pulmonary in seventeen, parietal and pulmonary in fifty-six, parietal, pulmonary, and interlobular in one case. Of 137 cases in which adhesions existed, sixty were of the right pleura only, thirty-one of the left only, and forty-six of both. In ninety-three cases adhesions were the sole inflammatory product.

Causes.—The age of the child appears to afford no exemption from the disease, but how far it enters fairly into the list of causes it is not so easy to say. It may certainly occur at any age, from a day old upwards. Billard and Berton believe that simple pleurisy is more common among infants than is generally believed, but that it is much more so after five years; and M. Barrier's researches confirm this opinion. Rilliet and Barthez state that of twenty-one cases of simple pleurisy, eight occurred from one to five years, and thirteen from six to fifteen; and of sixty-one cases complicated with pneumonia, forty-four were from one to five years old, and seventeen from six to fifteen. Dr. Stewart thinks that at the age of three years pleurisy is as common as among adults; M. Barrier, that it is rare before the sixth year. Dr. Battersby thinks that Dr. Stewart is nearest the truth, judging by his experience.

Secondary pleuritis, or pleuritis combined with pulmonary diseases is more frequent among young children. In 3392 autopsies of children from one to two years old, M. Baron found pleurisy in 205, or six per cent.: and in 181 autopsies from two to fifteen years old, the pleura presented evidences of inflammation in 158, or eighty-seven per cent.; that pulmonary complications existed in two-thirds from one day to one month old; in four-fifths, from one month to one year; and in eight-ninths from one to fifteen years. M. Hache found the pleura inflamed in eighty-one out of 194 autopsies, and in none was it the simple disease. M. Valleix mentions that of ninety-two cases under two and a half months, examined by M. Vernois, fourteen only showed signs of pleurisy, and of the whole number, one-sixth had been so affected. Mr. Crisp, in forty-one autopsies of children under two years old, discovered pleuritis in six; in one, simple; in five, combined with pneumonia. M. Barrier observed no case of pleuritis independent of pneumonia before the sixth year; very few between the sixth and tenth; but from the tenth to the fifteenth it was nearly as common as with adults.

From the researches of Rilliet and Barthez, it would appear that simple pleurisy is more common among boys than girls; in twenty-one cases, twenty were boys and one a girl. Secondary pleurisy is equally common in both, but what they call cachectic pleurisy prevails more among girls than boys. In eighty-two autopsies of boys, M. Hache

As a general rule, in chronic pleurisy bloodletting is rarely called for; certainly, if we detect the commencement of the disease, it would be advisable, but this is seldom the case; and at the period when we are called to see the child, the mildness of the symptoms, the absence of fever, &c., rather indicate another line of treatment.

If there be much fever, with a quick, firm pulse, and, above all, if pneumonia exist, we shall derive great benefit from the employment of tartar emetic for a few hours, given so as to produce slight nausea, but not vomiting. Dr. Condie speaks very highly of a combination of tartar emetic and nitre given in the following form:—

R.—Nitr. potassæ, ʒj.
 Antim. tartar. gr. ij.
 Sacch. alb. ʒij.
 Aquæ, ʒiv.

A teaspoonful to be given every two or three hours, according to the age of the patient.

Calomel, either alone or combined with James's powder, ipecacuanha, or tartar emetic, is a most valuable remedy. Small doses may be given two or three times a day from the commencement, and continued until the violence of the disease abates, unless diarrhœa should occur, or the gums become tender. If the state of the bowels forbid the continuance of the calomel, even though guarded by the pulv. cretæ cum opio, or Dover's powder, we may substitute the hydr. cum cretâ. I have before remarked that mercurial diarrhœa in children is nearly as good a sign of the constitution being under the influence of the mineral as pyalism in the adult. The treatment by calomel, when it can be borne, is well suited to those cases of secondary pleuritis in which bleeding and tartar emetic are counter-indicated, and in chronic pleurisy, where they are unnecessary and unsuited.

I need hardly state that the bowels should be kept free throughout the attack. At the commencement, a brisk purgative will be found very beneficial; but, in repeating it, we must be careful not to occasion diarrhœa, if we wish to persist in the use of mercury. When diarrhœa exists, a little compound powder of chalk, with the powder of chalk and opium, may be given, or chalk mixture, with aromatic confection and a few drops of laudanum.

After the first acuteness of the disease has subsided, when the pulse is quieter, and the fever nearly gone, very great benefit will be derived from blisters, small ones and repeated, over the side affected. They are peculiarly applicable to secondary and chronic pleuritis, in connection with calomel and diuretics. In some cases, a sharp liniment will be sufficient, applied alternately to the back and front of the chest.

The majority of writers are agreed upon the benefits to be derived from *diuretics*, given not in the very early stage of the disease, but after the fever has somewhat subsided, and continued for some time.

In secondary and chronic pleurisy, they are also of great value, not merely as a derivative, but as probably promoting the absorption and evacuation of the fluid effused into the chest. Squills, digitalis, and nitre, may be combined with the calomel, or formed into a mixture with mucilage, syrup, and water, or combined with an expectorant. Some mixture should be ordered to soothe the cough, and with this the diuretic may very well be combined. Dr. Eberle speaks highly of the *tinctura sanguinariæ canadensis*.

Warm baths at the beginning are very soothing, but at a more advanced period of the disease they may exhaust the patient too much.

As in bronchitis and pneumonia, I have found the patient derive benefit from a constant poultice of bread and water, or linseed-meal, applied to the chest, over the dressing, if a blister have been applied ; if otherwise, next to the skin.

The diet must be low and simple until the acute stage be past, but then it may be gradually improved. The utmost care will be necessary during convalescence.

I have already alluded to the operation of paracentesis in chronic pleurisy. The success of the operation seems to have varied in different hands. Dr. Henry Bennett, in his paper,* states that Boyer had performed the operation several times, but without success ; that Dupuytren had seen only two successful cases out of fifty ; Sir A. Cooper only one ; Gendrin not one out of twenty on which he operated. Dr. Bennett himself has seen three unsuccessful cases. On the other hand, he has recorded six successful cases out of nine by Dr. Davies, and several by Dr. Hamilton Roe. Herpin succeeded in one case, and Heyfelder in three. Dr. Hughes mentions that within the last four or five years the operation must have been performed from twenty to thirty times in Guy's Hospital.

As to the place and mode of operating, Mr. Cocks observes : " Auscultation and percussion are the best and surest means to detect the presence and the situation of the fluid, and on this and this alone we must place dependence. In the great majority of instances, the existence of the fluid will be most clearly indicated at the lateral and posterior part of the chest, in a position somewhat central between the upper and lower boundaries ; and in every case which has come under my own hands, I have had occasion to tap below the angle of the scapula, between either the seventh and eighth or the eighth and ninth ribs, and at a point distant from one to three inches from the angles of the bones." " Our incapability of judging of the exact positions of the diaphragm, and the alterations which are liable to occur about the floor of the chest, from recent or old adhesions between that muscle and the base of the lungs, would lead me to deprecate the practice of making a low puncture. When we have the choice of two or three intercostal

* Lancet, December 30, 1843.

spaces, I would select the upper, or at any rate the middle one, as the least obnoxious to those casualties which may induce a failure in our object. Any advantage supposed to result from a depending opening can readily be obtained, as I shall presently show, by adapting the position of the patient to our purpose."* Previous to the operation, Mr. Cocks always employs Dr. Babington's exploring needle, of which he speaks most highly and deservedly. The instruments he employs for evacuating the fluid are, of course, the trocar and canula, but of a smaller size than usual. He prefers them of one-twelfth of an inch in diameter, and about two inches in length, and of a circular rather than an oval shape. In some cases of œdema of the subcutaneous tissue, a longer instrument may be required.

Mr. Cocks thus describes the operation itself which inflicts very little pain: "It will be found most convenient to let the patient sit *across* the bed, so as to admit of his body being readily lowered and supported over the edge. The spot having been determined upon, it is advisable to make a small puncture in the skin, just at the upper edge of the rib, with a narrow-bladed lancet, through which opening the exploring needle, and subsequently the trocar, may be inserted. This preliminary step is not absolutely necessary; but, as the skin is by far the most impenetrable and resisting of the tissues to be traversed, its previous division will render the introduction and withdrawal of the canula more easy, less forcible, and attended with a minor degree of pain and alarm to the patient. The exploring needle having been first introduced, and the presence of fluid ascertained, the trocar and canula may then be carried into the chest through the same track, giving the instrument a slight obliquity upwards, which will enable it to clear the edge of the rib. The depth to which the trocar must be passed will, of course, depend much on the thickness of the parietes, the presence of fat, muscle, or œdema, for which due allowance should be made; and in most instances the penetration of the pleura will be appreciated by the sensation conveyed to the fingers of the operator, especially if the integument has been previously incised, so as to diminish materially the friction. The remainder of the operation consists in getting rid of as much fluid as the strength and condition of the patient will bear, and carefully avoiding the admission of air into the cavity. On withdrawing the trocar, the fluid will at first be found to flow in a steady and equable stream, slightly augmented in force at each expiration. After the lapse of a shorter or longer period, the flow will become checked at each inspiration, and then the body of the patient should be gently lowered into a horizontal posture, and turned slightly over to the affected side, so as to bring the cavity directly over the opening; and in this position he should be duly supported by assistants. The fluid will now recommence flowing in an uninterrupted stream; and

* Guy's Hospital Reports, 1844, No. 3, p. 67.

when it again begins to flag, a still further quantity may be obtained, if the state of the patient permit it, by directing an assistant to make steady and continuous pressure on the lower part of the chest, by grasping it on either side with the hand. This may be kept up for a period varying from a few seconds to a minute, until a continuous stream can no longer be obtained, when the canula should be immediately withdrawn. The greatest care should be taken to remove the tube, and thus close the opening, while the chest of the patient is yet in the grasp of the assistant; but if he relax the pressure while the communication with the pleural cavity be still open, air will infallibly rush in. During the whole process of evacuation, the unremitting attention of the operator should be directed to the stream of fluid, which he should never allow to become completely interrupted during the effort of inspiration. The admission of the slightest quantity of air is immediately indicated by a peculiar sucking noise, which cannot be mistaken, and which should be the signal for the withdrawal of the canula. The wound requires nothing but the application of a small dossil of lint and a strip of plaster, and the patient may then be laid down on the bed. If he complain of faintness during the operation, some wine or ammonia may be given."

Dr. Hughes and Mr. Cocks have given the following *resumé* of twenty-five cases in which the operation was performed: "Of these twenty-five cases in which paracentesis thoracis was once or several times performed, thirteen may be fairly stated to have recovered, so far as regards the effusion into the pleural cavity. Two may be justly mentioned as having at least partially recovered. One of these has, after seven years, a fistulous opening into the pleura; and the other has still some, though comparatively a very small quantity of fluid in the right pleura, but feels so much better as to be actually in search of employment in his profession. Ten have *ultimately* died of other diseases, generally connected with that for which the operation was performed, but entirely independent of its performance. Of these ten cases ultimately fatal, six have died of phthisis; one of gangrenous pulmonary abscess of the opposite side; one, after three months, of chronic pneumonia; one rather suddenly, with hydrothorax in the other pleura; and one, a case of pneumothorax with effusion (in which the operation was performed simply with the hope of affording temporary relief), of pneumonia and pericarditis."

CHAPTER IX.

PULMONARY PHTHISIS.

THIS fearful malady, though less frequent than in adults, is by no means uncommon among the children of the poor, and such as are seen in foundling or children's hospitals, poor-houses, &c. ; in private practice, among more wealthy families, I do not think it is very common, except where it forms a part of a more general development of tubercles in scrofulous children. The characters, symptoms, course and termination, very much resemble the same disease in the adult, so that it will be unnecessary for me to enter minutely into the different parts of its history. There exist, however, differences sufficiently marked to be worthy of notice, and which have a practical bearing upon our treatment. These deviations from the ordinary course of phthisis, I shall point out as we proceed, as briefly as I can.

Experience has shown us that tubercular deposition is exceedingly common in infancy and childhood : thus M. Lombard found that one-eighth of the infants who died from one to two years old in the Hôpital des Enfants Malades, at Paris, were tuberculous ; two-sevenths of those from two to three years ; four-sevenths from three to four years ; and three-fourths of those who died from four to five years old. M. Papavoine makes a very similar report. M. Guersent calculates that tubercles are found in two-thirds or five-sixths of all the children from one to fifteen years of age, whose bodies are examined after death. M. Barrier states that he found tubercles in thirty-eight per cent. of those who died from two to five years of age ; seventy-two per cent. in those from five to eight years ; 100 per cent. in those from eight to eleven years ; and seventy per cent. in those from eleven to fifteen years. In 130 autopsies, he found that tubercles existed in seventy-five.*

Thus we see that the frequency of tubercular deposition is very great in the earlier years of life, and we further find that the organs most commonly affected are the lungs and bronchial glands ; but yet the lungs are not so invariably the seat of the morbid product in children as in the adult, for whereas M. Louis found in 125 adult cases, but one exception to the law, that wherever tubercles were deposited in any organ, they were also found in the lungs, MM. Rilliet and Barthez met with forty-seven cases out of 312 tuberculous patients, in which the lungs were entirely unaffected. This is the first deviation I have to bring before the reader. Dr. West has constructed a table, showing the comparative frequency of the occurrence of tubercle in different

* Mal. de l'Enfance, vol. i. p. 389.

organs in adults and children, which I shall take the liberty of extracting.

Of 100 cases in which tubercle was deposited in some of the viscera, it was present	Children from 1 to 15 years.	Adults from 20 years and upwards.	
	According to Rilliet and Barthez.	According to Louis.	According to Lombard.
In the			
Lungs	84	100	100
Bronchial glands . . .	79	28	9
Mesenteric glands . . .	46	33	19
Small intestines . . .	42	33	0
Spleen	40	13	6
Pleura	34	2	1
Peritoneum	27	0	0
Liver	22	0	1
Large intestines . . .	19	10	0
Membranes of the brain .	16	0	2
Kidneys	15	2	1
Brain	11	0.8	2
Stomach	6	0	0
Heart and Pericardium .	3	0	0

Symptoms.—The disease may set in during the course, or towards the termination of some other affection, especially if tubercular, and, of course, the symptoms will be modified more or less by the concurrent disease, or by the condition in which a preceding one may have left the patient. Or it may commence quite independently, and then the symptoms resemble very much those in the adult, differing rather in degree than in kind.

The child, at the commencement, seems unwell, loses its appetite, acquires a delicate semi-transparent look, complains of erratic pains in the chest, &c., even before alarm is excited by a cough. At first the cough is slight, dry, and more distressing by its frequency than its severity; as the disease advances, it becomes more troublesome, sometimes almost incessant, in other cases occurring in paroxysms. In a few cases, the cough is comparatively rare, attracting but little attention, but, nevertheless, it is present in almost every case. Rilliet and Barthez thus speak of this symptom: "The cough, once present, persists through the entire duration of the disease. It presents, it is true, great variations in its character and its intensity, but it is rare to find it suspended either completely or for a time. In one infant alone have we seen the cough commence after hæmoptysis, cease after a time, and not reappear until after a recurrence of the accident."* The respiratory movement is rarely natural, in general it is hurried, and sometimes extremely rapid, even up to 40, 60, or 80 in the minute, accompanied by an amount of dyspnœa, in some degree in proportion

* Rilliet and Barthez, *Mal. des Enfants*, vol. iii. p. 277.

to the amount of tubercular deposit, whether the tubercles be softened or in a crude state; or it may depend upon an accession of pneumonia or bronchitis, but if neither of these exist, it is stated to be a tolerably accurate measure of the extent of the disease. With some children we see the entire chest dilate, in others respiration is mainly accomplished by the movements of the diaphragm, and in a third class it is entirely costal.

In infants, there is no expectoration, and very rarely in children under six years of age; whether it be that none is thrown off, or that it is swallowed, is not easy to decide; from six to fifteen years, it is more abundant, and presents much the same character as in the adult, but it is not so easy to infer from the sputa the presence of a cavity. Nor is hæmoptysis at all common; it is extremely rare at the beginning, and in the course of the disease it occasionally just tinges the sputa. Towards the end it may occur more abundantly, and may even terminate life somewhat abruptly. MM. Rilliet and Barthez never saw it either at the commencement or in the course of phthisis, but in five cases the parents reported that it had occurred. Pain and uneasiness in the thorax is of uncertain occurrence; many patients are too young to complain of it; many have it not. When it does occur, it is sometimes behind the sternum, sometimes between the shoulders or in either side. Night perspirations, although they do occur, are much less common than in adults. Thus affected, the child rapidly loses flesh and strength, and the color of the skin is altered, but the symptoms which especially characterize the hectic fever of consumption in adults, such as the quick hard pulse, heat of skin, hectic flush, perspirations and general irritability, are generally less intense. This M. Barrier is disposed to attribute to the less frequent occurrence of suppuration and cavities.

Dr. West thus sums up the peculiarities of the symptoms as they occur in children: "1. The frequent latency of the thoracic symptoms during its early stages. 2. The almost invariable absence of hæmoptysis at the commencement of the disease, and its comparatively rare occurrence during its subsequent progress. 3. The partial or complete absence of expectoration. 4. The rarity of profuse general sweats, and the ill-marked character of the hectic symptoms. 5. The frequency with which death takes place from intercurrent bronchitis or pneumonia."*

It is evident that the symptoms already enumerated, although sufficient to excite our fears as to the disease, are by no means so characteristic as those in the adult, and are inadequate alone to assure us of its true nature. But by adding to them the information afforded by percussion and auscultation, even though that be not always so certain as we should wish, we shall generally be able to remove all doubt. There

* Diseases of Infancy and Childhood, p. 301.

are some peculiarities in the results of auscultation and percussion, which deserve our attention, and which have been succinctly pointed out by M. Barrier. "On account of the great resonance of the chest in children, it would require, in order to produce much dulness on percussion, that the tubercles should be both numerous and agglomerated; therefore, a very dull sound in children indicates a greater amount of tubercularization than an equally dull sound in adults. Moreover, in adults, the tubercles are generally concentrated at the top of the lung, producing a circumscribed dulness rarely appreciable, whereas in children, this concentration at the summit being less frequent, and the dissemination of the tubercles more general, the dulness is less circumscribed, less intense, and consequently less evident. But on the other hand, where dulness exists in adults, it corresponds generally to the advanced stage of phthisis, that is, to the presence of cavities; but with children, phthisis remains most frequently in the first stage up to the time of death, and the dulness corresponds to the crude condition of the tubercles."* The increase of sonoriety which we may occasionally observe in adults where cavities are formed, is necessarily less frequent in children because cavities are so. In some cases where the tubercles are thinly scattered through the lungs, the results of auscultation may be almost negative; but where they are collected in certain numbers, although both attention and an educated ear may be necessary, we shall generally be able to ascertain the true state of the case.

One of the earliest auscultatory phenomena, in the stage of crude tubercles, is the prolonged expiratory murmur, first noticed I believe by the late Dr. Jackson, of Boston, U. S., and confirmed since by the researches of Andral, Fournet, &c. M. Hirtz, of Strasburgh, has noticed a variation in the expiratory murmur in this stage, which he terms the *bruit expiratoire rapeux*; the sound is at once rougher and clearer than the normal murmur. According to M. Fournet,† it is not only modified by a degree of roughness and dryness, but its intensity and duration are increased in comparison with the inspiratory murmur, which is diminished, although it also requires a degree of roughness, dryness, and difficulty. Occasional changes in the tone of the respiratory sounds may, however, modify or obscure the foregoing peculiarities. These changes consist at first of a clearer murmur than natural, which may gradually increase to what M. Fournet calls a *timbre soufflant et bronchique*, which may exist from the first to the last stage of tubercles. The same author has ascertained that all these changes commence with expiration, but that by degrees at a later period they involve inspiration also.

* Mal. de l'Enfance, &c., vol. i. p. 651.

† Recherches Clinique sur l'Auscultation et sur la Première Période de la Phthisie.

Another sound, which has been termed a *bruit de froissement*, or *craquement sec*, has been mentioned as peculiar to the stage of crudity; but not only are these sounds obscure and observed with difficulty, but it would seem that their precise value and significance are not yet ascertained. MM. Rilliet and Barthez regard the hardness (*dureté*) of respiration, the prolongation of expiration with the sonoriety, as the most characteristic symptoms, but which are liable to be changed or masked by various circumstances. They attempt further to distinguish between miliary tubercles and the yellow or gray infiltration; in the former, they state that the respiration is rough, expiration prolonged, and the sonoriety unaltered; in the two latter cases, by the feebleness or absence of the respiratory murmur, and the diminution of loss of sonoriety.

There do not appear to be any special signs which correspond to the softening of the tubercles until these are in process of elimination, and cavities commence to form. If the cavities are situated in the upper part of the lung, and are sufficiently large, we shall have the mucous râle, cavernous respiration, gurgling, perhaps pectoriloquy, and dulness, just as in the adult. Whilst the cavities are small, the value of the mucous râle will depend upon its being limited to the situation of the tubercles, as it may also arise from bronchitic irritation, and when it is general, the probability would be that it does so. However, it must not be forgotten, as Rilliet and Barthez observe, that cavities do not always give rise to these peculiar signs, but rather to bronchial symptoms, as bronchial respiration, mucous râle, bronchophony and dulness, and also that symptoms of cavities may be present without any cavity at all. The vocal resonance is changed in phthisis, during the earlier stage, especially in those parts where the tubercles are numerous or agglomerated; the voice becomes more resonant, and occasionally we find bronchophony; at a later period, when cavities are formed, we may have pectoriloquy. In children as well as in adults, the vibration of the parietes of the thorax is diminished during the crude stage, and increased over large cavities, if any such form. These phenomena are generally present in children as well as in adults, nor are they much more difficult to ascertain generally; the chief obstacle arises from the restlessness and unwillingness of the child to submit to examination, but with gentleness, patience, and a little coaxing, we may always attain our object.

Externally, the two sides of the thorax may present different degrees of mobility, according as one side is more affected than the other. Occasionally, when cavities exist on one side, we may perceive a depression of the subclavicular region, and this part is less dilated during inspiration. According to M. Hirtz, the thorax becomes more cylindrical, *i. e.* the transverse diameter, which in the normal state is greater than the antero-posterior, gradually diminishes. Lastly, we may proba-

bly perceive a difference of volume between the two sides of the chest ; but M. Barrier has given a case which shows that this is not *always* a proof of a greater amount of disease in the smaller.

Dr. West thus enumerates the more important peculiarities in the phenomena observed by auscultation in the child : "1. the smaller value of coarse respiration, prolonged expiration, and interrupted breathing, owing to their general diffusion over the chest, and to their occasional existence independent of phthisis ; 2. the apparent and to some extent the real exaggeration of the signs, both of the early and of far advanced disease of the lungs, in some cases of bronchial phthisis ; 3. the loss of that information which the phenomena of the voice furnish in the case of the adult ; 4. the small value of inequality of breathing in the two lungs ; 5. the difficulty of detecting minute variations in the sonority of the chest ; and 6. the existence of dulness in the interscapular region, together with moderate resonance of the upper part of the chest, and tolerably good respiration there, which are characteristics of the presence of enlarged bronchial glands."*

I have already mentioned that in many cases the symptoms are but slight for some time after the commencement of phthisis ; but as the disease advances they assume a much more serious character, though not steadily progressive. We may observe great fluctuation ; some days the child seems better, with less cough and dyspnœa, and better appetite and spirits ; then an attack of bronchitis, or perhaps pneumonia, throws the child into a very distressing and alarming state ; or the concurrence of bronchial phthisis presents a more aggravated condition than usual. As the disease advances, we find the cough generally more troublesome, the respiration more hurried and attended by wheezing, with little or no expectoration ; if the child be young, it becomes rapidly emaciated and very feeble. Some degree of hectic may ensue, with partial night-sweats, but not at all as well marked as in adults. The mouth frequently becomes aphthous, and the stomach and bowels deranged ; and though diarrhœa is not uncommon, it does not alternate with the night-sweats as in the adult. "In a very large proportion of cases of phthisis, the functions of all the organs of the body become at length so much disturbed, and nutrition generally so much impaired, that the patient dies, because the whole machine is worn out. But though this is the case in many instances, yet it often happens, even where the powers had long seemed nearly exhausted, and the body wasted almost to a skeleton, that death is far from tranquil, but is preceded by hours of severe agony, for which it is not easy to account. In many cases, and especially in those where the disease runs a rapid course, the fatal termination is due to an attack of intercurrent bronchitis or pneumonia, which is sometimes supposed to have been the patient's only disease,

* Diseases of Infancy and Childhood, p. 302.

until a *post-mortem* examination reveals the tubercular degeneration of the lungs, to which the inflammatory affection was but secondary. Death from hæmoptysis is rare, and still rarer is the perforation of the lung by the walls of the cavity giving way at some point, and thus producing pneumothorax. The abdominal symptoms sometimes mask the thoracic, and the patient dies of tubercular peritonitis, who, had life been prolonged, would have sunk eventually under pulmonary phthisis. Many children in whom the signs of incipient phthisis have appeared, die of acute hydrocephalus, excited by the membranes of the brain having become the seat of tubercular deposit; and some, in whom the disease has attained a more advanced stage, are suddenly carried off by head symptoms, the cause of which is explained by the discovery of large masses of tubercle in the cerebral substance. Convulsions, however, sometimes precede death for several hours, or head symptoms of greater or less intensity constitute the most striking feature in the patient's history for some days before death takes place, and yet an examination of the body throws no light upon the cause of their occurrence. Sometimes, too, the symptoms that precede death are those of fever of a typhoid character, rather than of serious mischief in the chest."*

Such is the graphic picture of the termination of phthisis from the pen of no ordinary observer. From the beginning to the conclusion, these melancholy cases advance from bad to worse, with but rare intervals of comfort to the bystanders, fewer still of hope for the little patients. The entire duration of the disease varies a good deal. According to Rilliet and Barthez, it averages from three to seven months. M. Barrier states that the non-acute cases are not so prolonged as in the adult, and that the course is shorter in proportion as the child is younger. Dr. West mentions that he has known cases persist two, three, four, or nearly five years before terminating fatally. I should be inclined to think Rilliet and Barthez's estimate within the mark, at least for patients in private practice.

Modifications and Complications.—1. Now and then we meet with unusually *rapid* cases of the disease; and, in such cases, we are liable to fall into an error of diagnosis, inasmuch as the symptoms present all the characters of an acute disease, and there is not time for the peculiar symptoms to manifest themselves. M. Barrier states that such are more common than in adult life. Dr. West has given the following case in illustration: "A remarkable instance of this came under my notice some years ago, in the case of a little boy, nine months old, who was fat and ruddy, and had always had perfectly good health until the 10th of April. On that day, he was taken with symptoms which his mother supposed to be those of a bad cold. On account of this he

* West, Diseases of Infancy and Childhood, p. 309.

was kept in the house, and various domestic remedies were employed, though without any improvement, and on April 24 he came under my notice. There did not then appear to be any urgent symptom, though the child seemed much oppressed at the chest. The case appeared to be one of rather severe catarrh, occurring during the period of dentition. The gums were lanced, and a mixture containing the vinum ipecacuanhæ was ordered, to which, finding the symptoms did not abate, small doses of antimonial were added on the 27th. On the 30th I was informed that the child was much worse, that his dyspnœa was greatly increased, and that his hands and feet had been swollen for the last forty-eight hours. I found the little boy breathing fifty times in the minute, with great oppression at the chest, the face much flushed, the skin dry, the trunk hot, the limbs cool, and the hands and feet much swollen. Auscultation detected generally diffused small crepitation through both lungs, with indistinct bronchial breathing at the upper and back part of the left side. Three hours after this visit, the child died without a struggle, on being lifted out of bed for his mother to apply some leeches to his chest. On examining the body after death, a very thick layer of fat was found everywhere beneath the integuments. The lungs presented an extreme degree of tubercular degeneration, and many of the bronchial glands were enlarged by the morbid deposit to the size of a pigeon's egg. None of the tubercle in the lungs was softened; but it existed both in the form of yellow miliary tubercle, of tubercular infiltration, and of masses of crude tubercle formed by the agglomeration of many separate deposits. The pulmonary substance in the intervals between the tubercular deposits was of a bright red color in the first stage of pneumonia, and in many parts bordering upon the second stage; and there was very considerable injection of the bronchial tubes. The various abdominal viscera contained tubercle, but it was not far advanced in the mesenteric glands."

2. On the other hand, the disease may assume an unusually *chronic* form, and, instead of terminating in two or three months, may run on to a year, or even more. In such cases, however, we are not exposed to the same liability to error in our diagnosis. The patient, or the parents, however, suffer more from the fluctuations of hopes and fears. I shall again trespass upon Dr. West for an illustration. "In March, 1842, I saw a little girl, six years old, whose father had died of phthisis, and who had had a cough ever since she suffered from measles, two and a half years before. Her mother's anxiety had been excited by the increase of this cough, and by the child's losing flesh during the few weeks previous to her coming to me. Auscultation at this time discovered that air entered the lung in the left infra-clavicular region more scantily than in the right, and that the respiration was coarse and attended with much creaking at the upper part of both lungs. In May, the general symptoms were much improved, and the creaking sounds

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were no longer heard. For many months, the child continued to appear tolerably well, though her cough never ceased entirely; but in the early part of the winter of 1844 her health completely failed. Examination of the chest in the beginning of December elicited great deficiency of resonance at the upper part of the left lung, both in front and behind. Bronchial breathing, intermixed with large mucous râle, was heard in the left supra-scapular region, and abundant moist sounds pervaded the lung posteriorly. In the left infra-clavicular and mammary regions, the respiration was very deficient, and accompanied with distant moist sounds. Extreme coarseness of the respiration was the only morbid sound heard at the upper part of the right lung, and the breathing on that side was puerile in other parts. In January, 1845, the child had slight hæmoptysis, which recurred occasionally at intervals of a few weeks or months until her death, but was not profuse at any time. In September, 1845, resonance was slightly impaired under the right clavicle, and also in a greater degree posteriorly as far as the angle of the scapula. There was absolute dulness of the left side as far as the nipple in front and the angle of the scapula behind. There was no natural breathing in the left lung, but the respiration was bronchial, and accompanied with large mucous râle as low as the nipple, the râle being smaller and the admission of air scanty below that point. About the left scapula, there were cavernous sounds and distinct gurgling, smaller moist sounds lower down. In the right lung, respiration was puerile in front, except quite at the upper part, where the breathing was coarse, and attended with mucous râle: and posteriorly the characters were still more marked. It cannot be necessary to detail the results of the subsequent examination of the chest, which showed that disease advanced slowly in the right lung, though there was at no time proof of the existence of a cavity there. The child's condition fluctuated; sometimes she seemed almost dying under an aggravation of all the symptoms, and then again she rallied, and was able to walk about, and seemed tolerably comfortable. Life was prolonged until June, 1847, and she had seemed almost as well as usual until a very few days before her death." This case, we see, lasted five years at least. I have under my care at this moment a little girl who has been similarly affected for two years, and as yet only the upper third of the left lung is involved, the remainder of that lung and the whole of the right being free. She is delicate, but quite able to go about, with but little cough, no night-sweats, little expectoration, no hæmoptysis, some degree of emaciation, and a feeble appetite. Dr. West mentions another case, which has lasted still longer; and I doubt not that similar cases are occasionally met with by other medical men.

3. I have already mentioned that the course of phthisis is often much modified by attacks of *bronchitis*, which are sometimes attributable to cold, and at other times occur without any assignable cause. They are marked by increase of fever, more rapid breathing,

more distressing cough, &c., and by the presence of bronchitic râles in one or both lungs. The extent varies; sometimes it is very considerable, and accompanied with great exhaustion; in other cases it is much slighter. By degrees the attack may subside under appropriate treatment, and the patient gradually recover a certain amount of health and comfort, but if not, it will, of course, hasten the progress of the primary disease, and shorten the patient's life.

4. Another frequent complication of pulmonary phthisis in early life is *pneumonia*, which, according to Rilliet and Barthez, occurs more frequently before than after the tenth year. If it occur at an early stage before attention has been drawn to the tuberculous deposit, a superficial examination may easily lead to an erroneous diagnosis. Several causes for the attack have been enumerated by Rilliet and Barthez. 1. It may result from the local irritation of the pulmonary tubercle, and then it surrounds the latter, and we find the tissue of the lung hepatized and mixed with a variable quantity of miliary tubercles. It may either be lobar or lobular, but the latter form is more frequent. 2. The lung being very tuberculous, the pneumonia may be situated at the part most free, *i. e.* at the base, like the terminal pneumonia of adults; it is always lobar, and can hardly be attributed to the irritation of the tubercles, but most likely to the susceptibility acquired by that part of the lung upon which its functions depend. 3. When the lungs are but slightly tubercular and other organs very much so, pneumonia may be developed which is not under the local influence of the tubercle. It is a secondary inflammation, analogous to that which complicates chronic catarrhs, and which exhibits the characters of cachectic phlegmasia. 4. In cases where the tubercles are few, the pneumonia may be altogether independent of this cause, and is due to some other disease, as measles, whooping-cough, &c.* Both lungs may be attacked, but when one only is affected by lobular pneumonia, it is more frequently the right, and when by lobar pneumonia, the left lung is more liable than the right. I have already mentioned the difficulty of diagnosis, unless sufficient care and attention be paid. It is of great consequence that we should ascertain the presence of tubercles, and not hastily assume that the case is one of ordinary pneumonia. "The existence of a considerable amount of tubercular deposit in the lungs may be imputed in those cases in which the degree of oppression of the chest has, from the very commencement of the illness, been altogether out of proportion to the severity of the catarrhal or bronchial symptoms with which the disease set in. A further evidence of its nature is afforded if the skin, though very dry, present a less considerable or less pungent heat than attends simple pneumonia, while the pulse from the very outset is less deve-

* Mal. des Enfants, vol. iii. p. 243.

loped. Suspicion would be strengthened if the frequency of respiration very greatly exceeded the amount of mischief disclosed by auscultation, and especially if the rapidity of the breathing, though so great that it would excite the most serious alarm if the case were one of pneumonia, should yet continue the same for days together, without marked deterioration in the patient's condition. Auscultation also would throw much light on the nature of the case, for the sounds detected in the chest would be the subcrepitant and mucous râles rather than the small crepitation of pneumonia, while though the smaller sounds would be discovered at the lower part of the chest, the greatest dulness on percussion would generally be detected at the upper part, and bronchial breathing would very likely be perceived more or less distinctly in the same situation."* We must also take into account the constitution of the child and of his immediate relations, the presence of scrofulous disease in any of them will naturally confirm our suspicion of the existence of tubercles, and we must carefully observe the accordance or discordance of the signs and symptoms of each disease. The danger of this complication is very great, not merely as to the immediate shortening of the patient's life, but as destroying whatever little hope there may have been of a favorable issue, so that our prognosis should in all cases be very guarded.

5. But pulmonary phthisis in children differs from the same disease in adults by the more frequent occurrence of tubercular deposition into the bronchial glands, or *bronchial phthisis* as it is termed. In the adult, this occurs about once in four cases of phthisis, but it is subsidiary to the pulmonary affection; in children, it constitutes a very important disease, often more considerable and nearly as frequent as the deposition in the lungs. Dr. West states that tubercle existed in the bronchial glands in fifty-four out of fifty-five cases that came under his notice, in which it was present in some organ or other; in eleven of these cases it was in an incipient state; in twenty-five, all the glands were affected by it; in twelve, the tubercle was both generally diffused and was more or less softened; in two, the tubercle was in a firm, friable, cheesy state, and in four it had begun to undergo the cretaceous change. This form of disease generally occurs between the ages of two and six years, though it is by no means limited to that period. The symptoms differ a good deal from those in the adult; the attention may be first attracted by a severe attack of bronchitis, either after measles or independent of it. The cough and dyspnoea are the most prominent symptoms, the former is frequent and severe, occurring in paroxysms somewhat resembling those of whooping-cough, or those we observe in vesicular bronchitis. The respiration is hurried and oppressed, with considerable wheezing; the veins of the neck are swollen, and those

* West, Diseases of Infancy and Childhood, p. 303.

of the surface of the thorax become dilated. "The great fluctuations which take place in the condition of the patient constitute one of the most striking characteristics of this form of phthisis. Attacks of bronchitis sometimes come on, during which the respiration becomes painfully accelerated and oppressed, and the paroxysmal cough is merged, for a time, in a constant hacking or suppressed attempts at coughing. These bronchitic symptoms, which often seem to threaten life, and which sometimes actually destroy it, clear up by degrees, in the majority of cases, but leave the child with a severer cough and more hurried respiration than before, while it loses flesh rapidly, and not infrequently sweats a good deal about the head and upper part of the trunk. Accommodation of posture, too, in many instances, becomes necessary to the comfort of the little patient, who perhaps can breathe only when supported in its mother's lap, or when much propped up in bed. It is seldom when the disease has reached this degree of severity that there is entailed so large a measure of tubercular affection of the lungs and other viscera, as to render recovery quite hopeless, and the characteristic signs of bronchial phthisis become lost, by degrees, in those of ordinary consumption. Sometimes, however, a long pause takes place in the progress of the disease, even though thus far advanced; the cough, which had acquired fresh intensity, gradually abates; the respiration is no longer habitually wheezing; the patient can repose in any attitude; the flesh lost is regained; and were it not that the cough still continues, though less frequent and less severe, that the breathing is more hurried than natural, and that auscultation contributes still further to undeceive us, we might fancy that all ground for anxiety was passing away, and that the child was on the high road towards recovery. In some cases, too, in which symptoms such as have been described are observed, recovery does eventually take place. It is seldom possible to say in any case by what means this recovery is brought about; sometimes no doubt the tubercular matter makes its way into the air-tubes, and is got rid of by expectoration. Once I observed the disappearance of most well-marked general signs of consumption in the case of a girl eight years old, during the copious expectoration of a tenacious mucus in which were small quantities of a substance like broken down cheese, or grains of boiled rice, and which was attenuated with an expectoration of thick puriform matter more or less tinged with blood. In the case of this child, an attack of measles, while in her seventh year, had been succeeded by cough, the formation of abscesses in her neck, and a frequent puriform and sanguineous discharge from her nose. These abscesses had not been long healed, when her mother's alarm was excited by her expectorating blood, mixed with the phlegm which she brought up when coughing. Though not much emaciated, the child looked unhealthy, her pulse was very feeble, and there were many small petechiæ on her extremities. The lungs, however, were tolerably free from disease; for nothing more

was heard during auscultation than a good deal of ronchus mixed with some moist sounds, which were most evident at the upper part of the chest. Expectoration such as I have described continued for nearly three months, in the course of which the child by degrees lost her cough and acquired strength under the use of steel and other tonics. Two years afterwards no auscultatory signs of disease were perceptible, except a little creaking under both clavicles, and at the end of five years even this had disappeared."*

The signs and symptoms which accompany this affection are by no means always very characteristic; there may be but few signs present, or the cough, dyspnœa, &c., may be owing to the coincident deposition of tubercles in the lung, and if the latter be pretty well advanced, it will be quite impossible to distinguish between them. If, however, the patient be of a tuberculous cachexia, and have been placed in circumstances to favor its development, and if the general symptoms, such as cough, dyspnœa, expectoration, &c., exist without any physical signs of disease of the bronchi, lungs, or pleura, we may have ground for suspecting the existence of bronchial phthisis. According to M. Barrier, the results of percussion are completely negative, when the disease is limited to the glands, and in general, auscultation is little more satisfactory. Sometimes, however, the swollen gland compresses a bronchus, diminishing its calibre, and then the respiratory murmur will be enfeebled in that part of the lung to which the tube is distributed. In such cases the clear sound on percussion, combined with the feebler respiration, cannot be attributed to tubercles of the lung, but would seem to justify our considering the case to be one of tubercular deposition in the bronchial glands. Both M. Becquerel and M. Barrier have verified, after death, a diagnosis founded upon this combination. Again, if the signs of a cavity appear in the neighborhood of the mediastinum, but nowhere else, we may presume without much hesitation, that they result from the suppuration of tubercular masses in the glands, and which may be voided through the larger bronchial tubes. The palpitations and anasarca which are sometimes produced by the tubercular matter in or near the mediastinum, pressing upon the larger vessels, are not of much value as to diagnosis, inasmuch as neither is uncommon in pulmonary phthisis. So that, upon the whole, it is evident that the distinction during life between bronchial and pulmonary phthisis is one of great difficulty, depending upon minute symptoms and close and accurate observation. At an advanced period, this is of no great consequence; but as the progress of the former disease is much slower, it may be some comfort at an early period to know that the disease is one which, at least, admits of considerable prolongation of life. But more than this, for it seems undoubted that bronchial

* West, Diseases of Infancy and Childhood, p. 295.

phthisis is to a certain extent a more curable disease, or rather one in which recovery more frequently takes place; and that, in various ways, either the tubercular matter may be absorbed, or it may be converted into cretaceous substance, or the gland may suppurate, and emptying itself completely into the bronchial tube, may heal; and, if it be an isolated gland, the child may recover; but such cases are rare. Death, rather than recovery, is the ordinary termination of the disease, either by suppuration of the tubercular masses which exhausts the patient, or while the tubercles are yet in a crude state; but more commonly by the participation of the lungs and other organs in the tubercular degeneration. The prognosis, therefore, is at best very doubtful, and in most cases very unfavorable.

6. Rilliet and Barthez mention that both *Emphysema* and *Œdema* occasionally accompany tubercles of the lung; but the former does not appear to hold any definite relation to them, whereas, the latter is either the direct result of the tubercles, or of the pressure exercised by them upon some of the pulmonary vessels.

Morbid Anatomy.—The pathology of pulmonary phthisis in children does not vary very much from the same disease in adults, and therefore I feel it the less necessary to enter fully into details. In the large majority of cases, both lungs are engaged; out of seventy cases, M. Barrier found six only in which one lung alone was involved, and of these six cases, five were of the left lung, and one of the right. In sixty-four cases, both lungs were engaged, even though in a third of the cases, the disease was but slightly advanced. In twenty-two, the left lung was most affected; in nine the right, and in thirty-three they were about equally so. As in adults, the apex of the lung is the part first and chiefly affected, the tubercles diminishing in number, and being less advanced as we descend. Unlike adults, in whom death seldom takes place until after the establishment of suppuration and the formation of cavities (provided there are no complications), we find death occur in children, in whom almost all the tubercles are in a crude state, or at least before large or numerous cavities are formed. This may arise either from the greater rapidity with which extensive depositions of tubercle take place, causing death before there has been sufficient time for suppuration or from the coincident occurrence of tubercles in other organs or glands. In eleven of thirty-three cases, related by M. Barrier, there were either no cavities or extremely small ones.

When tubercularization has gone to a certain length, the pleura is rarely found in a state of perfect health; adhesions are very common, and tubercles are by no means rare.

The bronchial glands, as I have already remarked, seem to be more frequently affected than the lungs themselves; for M. Barrier states that of seventy-nine cases, sixty-nine had tubercles in the lung and bronchial glands, four in the bronchial glands only, and one in the

lungs only. Dr. West mentions that tubercle existed in the bronchial glands in fifty-four out of fifty-five cases in which it was present in some organ or other; in eleven, it was in an incipient state; in twenty-five, all the glands were affected by it; in twelve the tubercle was both generally diffused and was more or less softened; in two, the tubercle was in a firm, friable, cheesy state; and in four, it had begun to undergo the cretaceous change. Any of the glands may be thus affected; but the most important are those lodged in the mediastinum. As a general rule, the enlarged glands produce less inconvenience from compressing the neighbouring parts than we might expect; nevertheless, we have sometimes to complain of such effects. The bronchial tubes may be compressed and flattened, or their coats may be thinned, eroded, or destroyed, the covering of the gland supplying their place and completing the wall of the tube. This, in the course of time, may give way, and the softened tubercular matter be poured direct into the bronchial tube. M. Guersent is said to have found the entire gland enucleated and passed into the tube. The pulmonary artery and veins may be compressed, and to this they are peculiarly exposed from their connection with the glands. The aorta may also be compressed, and its calibre diminished. M. Becquerel mentions a case of M. Durand's, of a girl whose trachea, large bronchi and aorta, were compressed by tubercular glands, which had thus apparently given rise to hypertrophy of the left ventricle. Compression of the vena cava thus effected may give rise to partial or general dropsy. The œsophagus is rarely altered in volume.

As to the tubercles themselves, as in the adult, they may present themselves in the lungs in the form of miliary tubercles, or in masses, or diffused more generally through the substance of the organ. Whether in the lungs or bronchial glands, the matter may be in either a crude or a softened state. In a crude state, the tubercles are either gray and semi-transparent or whitish or yellow, with a caseous appearance, which generally succeeds the earliest stage. In the glands, the matter is sometimes deposited in such quantity that, instead of remaining isolated, several are joined, and form irregular masses of large size, in which, by dissection, we can trace the fibrous envelopes of each gland; but in the end these often disappear, and then the tumor will be simply surrounded by a general cyst. After a time, suppuration occurs, commencing generally in the centre of the tubercular mass, and proceeding to the circumference until the whole is softened and evacuated by means of a communication with some of the bronchial tubes. A similar process takes place in the tuberculous glands; but, after the mass is softened, the attempt is made to evacuate the matter by perforating the cyst and reaching the nearest bronchial tube, through which the puriform matter is evacuated. An empty bronchial cyst may be mistaken for a true pulmonary cavity, if care be not taken; but it may be distinguished by its fibrous capsule, and also, according to Rilliet and Barthéz, by the perforation into the bronchial

tube being situated laterally. Occasionally, the suppuratory bronchial glands have perforated the œsophagus, and even the pulmonary artery, according to M. Berton.

Tubercular matter, whether in the lungs or bronchial glands, may undergo calcareous transformation, though it is rare; and this has been mentioned as one mode of cure. M. Becquerel has occasionally observed a steatomatous condition of the glands, which he regards as a transformation of tubercular matter. Dr. West enumerates four points in which tubercles in the lungs of children differ from those in the adult: 1. In the greater frequency with which gray granulations and crude miliary tubercles exist in the lungs independent of each other and of any other form of tubercular deposit; 2. The greater frequency with which yellow infiltration of tubercle is observed in early life; 3. The greater rarity of cavities; and 4. The abundant deposit in the bronchial glands.

I do not presume to present this sketch to the reader as anything like a complete account of the pathological anatomy of tubercle, which will probably be already familiar to them from the perusal of the various valuable works we possess on pulmonary diseases, but rather as a notification of the peculiarities which it assumes in children, and of some points in which it differs from the disease in adults. Neither do I deem it at all advisable to enter into the causal origin of tubercles, how far they are independent of or how far they result from inflammation, &c., &c. Such questions are doubtless of deep interest, and much light has been of late years thrown upon them, but they would be unsuitable in a work like the present; and I must refer my readers to the various works on diseases of the chest, where they will find the subject treated with knowledge and acuteness far beyond mine.

Causes.—There can be no doubt that a scrofulous constitution whether inherited or acquired, is the most influential predisposing cause. Neither can we be surprised that close, dark, damp, unventilated dwellings, insufficient clothing, and scanty or improper food, should induce that condition of body which renders the liability to phthisis so fearfully greater among the poorer population of towns and cities. The immediate cause of the attack is very often, if not generally, exposure to cold in some form or other; or the disease may succeed to some of the eruptive diseases, or to ordinary bronchitis or pneumonia in children in whom the predisposition exists.

Diagnosis.—1. In the early stage of the disease, the difficulty will be to distinguish between pththisis and bronchitis; but in the former, we may have some degree of dulness at the upper portion of the lung, and a mixture of the crepitus of tubercles, neither of which will be found in bronchitis. The constitution of the child will also sometimes throw light on the diagnosis. At the same time we must not forget that both diseases may be present. At a later period, the pathognomonic characters are very different.

2. *From pneumonia.*—A similar difficulty besets us here, for pneu-

monia may complicate the case as resulting from tubercles, and to distinguish this from simple pneumonia is by no means easy. We may derive some guidance from previous auscultation, if the lungs were then free from the secondary disease, and also from the duration of the pneumonia; or, if it be prolonged with alternations of increase and diminution, we may suspect that it is tubercular. Again, tubercles are at an early stage confined to the upper part of the lung, simple pneumonia more frequently occupies the inferior portions, and the small crepitus of the latter disease is quite distinguishable from the tubercular râles; and, lastly, the amount of fever is much greater in pneumonia than in uncomplicated phthisis. At a later period, when the tubercles are softened and perhaps cavities formed, the diagnosis from simple pneumonia is comparatively easy.

3. I have already enumerated the distinctive points, slight as they are, between *bronchial* and *pulmonary phthisis*; and I may add that in many cases such a diagnosis is not only very difficult, if not impossible, but somewhat unnecessary, as the diseases very seldom occur or continue long separately.

4. As to some other disease from which it is desirable that phthisis should be distinguished, Dr. West observes that "it is important to bear in mind that strumous dyspepsia, as it has been called by many writers, is of more frequent occurrence in childhood than in adult age, and that its symptoms may be all that mark the advance of phthisis in the lungs until within a month or two of the patient's death. A definite commencement can always be assigned to the commencement of remittent fever; and the great heat of skin, the very rapid pulse, the intense thirst, and the delirium at night which attend it, even in its less severe forms, are symptoms which, if borne in mind, would prevent our mistaking for it those slighter and more vague ailments that are experienced during the first stage of phthisis. The referring the symptoms of incipient consumption to the presence of worms in the intestinal canal is a mistake even less excusable. The natural temperature of the skin and natural frequency of the respiration, the appetite at one time as ravenous as it is deficient at another, the tongue either clean and moist or thickly coated, the condition of the bowels, which is generally one of constipation, and the marked relief which almost always follows the action of purgatives, are indicative of the presence of worms sufficiently characteristic to guard the attentive observer from error."*

Prognosis.—The prognosis is of course more or less unfavorable in all cases, absolutely so in most, as many more cases prove fatal than the contrary, few of those in whom the disease is fully established being rescued from an early death. Yet cases of restoration do occasionally occur, not frequently, but just in sufficient numbers to induce us to tax

* Diseases of Infancy and Childhood, p. 294.

to the utmost our care and skill to give the patient the benefit of the slight chance in his favor. We should be a little guarded in attempting to fix the duration of life, as we have seen that in some cases the disease seems almost indefinitely prolonged.

Treatment.—I need say but little on this subject, as in principle the treatment of the disease in adults and in children is substantially the same, differing only in details. Perhaps the first and most important point to which our attention should be directed, is the air which the child breathes, and the atmosphere in which he lives. We must take care that this be pure, fresh, dry, and warm; the rooms should be thoroughly ventilated and cleaned in the absence of the patient, and then when sufficiently warmed, the child may be brought back. During the winter months, I am strongly in favor of confining the child, not merely to the house, but to two or three rooms on the second or third floor if possible, so as to avoid exposure to draughts of cold air, and to sudden atmospheric changes and cold winds. If circumstances permit a change of climate, it is often of very great service. The south of England or Ireland, and still more the South of Europe, offer all possible advantages of this kind to the invalid. Even in summer, in this climate, undue exposure may do great mischief, and a prevalence of north or east winds, or damp weather, should be the signal for confinement to the house. When the wind is mild, the air dry and genial, then exercise in the open air, in the early stages of the disease, is beneficial, but at a more advanced stage, it should be very moderate, for obvious reasons.

Inner garments of spun silk, web, or flannel, should be worn both winter and summer, as securing an equable warmth, and as a protection against a sudden chill, but they should never be worn in bed, as they then only increase the perspiration. Careful attention must be paid to the diet; it should be at once simple yet nutritious, as very few patients recover who are not able to take a full share of nourishment. Milk in any form, farinaceous food, certain leguminous vegetables, jellies, broth, beef tea, and even solid animal food may be allowed, subject to the condition of the patient, the state of the digestive system, the stage of the disease, &c. Nay, in some cases, even wine or beer may be advisable. On the other hand, if the stomach and bowels be weak or out of order, a careful selection must be made of those substances which experience has shown to be best tolerated by the stomach.

As to the most suitable remedies, I shall not attempt to go through the list of those which have been proposed. It will be quite sufficient to point out a few of them which appear to deserve our confidence the most. In very few cases indeed is bloodletting admissible, and then only to the extent of a few leeches. These cases are generally those in which the disease is complicated with pneumonia, but even then our especial object must be to exhaust the patient as little as possible. Counter-irritation is useful, and it may be practised by means of

small blisters, the size of a watch glass, below the clavicle, or by a liniment, or by daily painting the same part with strong tincture of iodine.

Much stress has been laid upon emetics, purgatives, chalybeates, &c. by different writers, and although I doubt not there are cases in which they may be beneficial, I fear their success has in no degree kept pace with the hopes which have been excited. The three remedies upon which most reliance seems to be placed are iron, iodine, and cod-liver oil. M. Barrier, however, speaks disparagingly of iodine, and even attributes to it an injurious influence upon the digestive functions. Iron has been supposed to counteract in some way the tuberculous cachexia, and Dr. Dupasquier, of Lyons, has derived more advantage from the iodide of iron than from any other preparation. My own experience is confirmatory of his; and I have found a convenient form to be a grain of the salt to an ounce of syrup, of which a teaspoonful may be given three times a-day to a child of three years old.

At the present moment the most popular remedy is cod-liver oil, and whether from the iodine it contains, or from its nutritive qualities, it is not easy to determine, but we certainly have quite evidence enough to prove its great value in this disease. As a tonic, bark in some form is often useful; and for the relief of the cough, a mixture may be ordered containing ipecacuanha squills, and a little laudanum. Hydrocyanic acid has considerable control over the paroxysmal cough. Chalk mixture, with opium and some astringent, may be employed, if the bowels are relaxed.

As to prophylactic measures, these consist mainly in incessant care and watchfulness; securing pure air, warmth, or even temperature, good diet, and guarding against cold, damp, improper food, &c. A very important point with infants who are likely to have inherited this predisposition, is to secure a healthy wet nurse from the country, and to let her suckle the child somewhat longer than the usual time, until the distress and irritation of teething be over. As the child advances in age, the opposite extremes of carelessness and over-care should be equally avoided, and when the intellect develops itself, we ought to be careful that the child be not stimulated to over-exertion or to too close application.

SECTION III.

DISEASES OF THE HEART.

BEFORE entering upon the consideration of the malformations or diseases of the heart, it appears to me that I shall be doing good services to my readers by extracting from the valuable work of Rilliet and Barthez their conclusions as to the normal state of the heart, and the results of auscultation and percussion in infants. They are based upon the examination of 193 cases, from fifteen months to fifteen years, and are as follows :—“ 1. The circumference of the heart does not increase in proportion to the age ; it is nearly the same from fifteen months to five years and a half ; from this time it increases irregularly up to puberty, but at the age of five years the limit is more marked when we measure the heart filled with coagula, as when empty its progression appears less irregularly increasing. 2. The distance from the base to the point anteriorly is nearly the half of the entire circumference at the base of the ventricles. 3. The maximum thickness of the walls of the right ventricles varies little according to age ; it is generally two millimetres up to six years, after which it is ordinarily three or four. 4. The maximum thickness of the left ventricle is less than one centimetre up to six years old ; after which it is one centimetre, or a little more. 5. The relative thickness of the two ventricles is generally, as pointed out by M. Guersent, as three to one or as four to one, rather more than less. 6. The maximum thickness of the septum is nearly the same as the left ventricle ; rather more than less. 7. We will add a remark, the result of our notes, that the thickest part of the right ventricle is quite at the base, near the auricular opening ; of the left ventricle, one or two centimetres from the base ; and of the septum, from two to three centimetres. It follows that the more considerable the thickness the nearer it is to the middle of the height. 8. The size of the right auriculo-ventricular orifice continues much the same up to the fifth year ; it scarcely increases up to the tenth ; but

from this age its increase is marked. 9. The left auriculo-ventricular opening, always smaller than the right, increases somewhat more regularly, and presents often the same dimensions as the distance from the base of the heart to its apex. 10. The aortic orifice shows but very slight increase between fifteen months and thirteen years. 11. The pulmonary orifice, on the other hand, increases notably from the age of six or eight years, so that, whilst previously it is about equal to the orifice of the aorta, afterwards it is much more considerable."* Rilliet and Barthez found no perceptible difference in their measurement between the two sexes.

I shall now extract their account of the results of auscultation of the heart and percussion:—"The præcordial region presents ordinarily a diminished resonance, though rarely absolute dulness, in a portion of its extent between the nipple and the sternum, and is from four to seven centimetres vertically, and from four to eight transversely. This comparative dulness, therefore, occupies a space, circular or elliptical, whose greater transverse diameter runs from the nipple to the sternum, and sometimes to the xiphoid cartilage, so that the nipple is central as to the height, and at the left extremity of this diameter. With children above six years, the nipple will sometimes be found above this centre. The ear applied to this elliptical space perceives easily the two sounds of the heart: the first is almost always duller than the second. Around this central space the heart's action is weaker, according to the distance, although we can generally perceive the sounds, or at all events the second sound, all over the thorax anteriorly. Ordinarily they are as audible, if not more so, beneath the right clavicle as the right nipple, owing, doubtless, to their being conveyed by the aorta superiorly; but in a small number of cases the pulsations of the heart are transmitted more plainly to our ears in the region of the liver than superiorly. In the normal state we have never heard the pulsations of the heart posteriorly. In the great majority of cases, the sounds of the heart succeed each other with regularity, and the interval between them is always the same in the child; some transient irregularities were merely exceptional and without value. Lastly, the radial pulse was always felt by the finger, just as the ear applied to the præcordial region perceived the end of the first sound; or, more correctly, the pulse corresponded to the commencement of the interval which separates the two sounds."

* *Mal. des Enfants*, vol. iii. Appendix, p. 262.

CHAPTER I.

MALFORMATIONS. INTRA-UTERINE DISEASES. CYANOSIS.

It will be sufficient to enumerate very briefly the principal malformations to which the heart is subject, referring the reader for minute details to the elaborate works of Meckel,* Geoffrey St. Hilaire,† and to M. P. H. Berard's excellent article in the *Dict. de Médecine*, in thirty volumes.

These malformations may be divided into—

1. *Anomalies as to Number*.—There are examples of children born without hearts, but of course this is incompatible with extra-uterine life; and as a general rule, such cases occur only in acephalous fœtuses. Double hearts only occur in instances of diplogenesia.

2. *Anomalies of Position and Situation*.—Instances have occurred of the apex of the heart being directed laterally to the right or left; and it is said to have been placed vertically. When the heart is displaced, it may still remain on a level with the chest, as in those cases where, the parietes not being closed, it is projected externally. M. Vaubonais relates a case in which “the heart was external, hung to the neck like a medal.” Other cases are related by Buttner, Martinez, Haller, &c. Or the heart may be found elevated to the neighbourhood of the head (*ectopie cephalique* of M. Breschet) as in the case related by MM. Breschet, Beclard, and Bonfils, where it was found in one between the bones of the jaw, and adhering to the tongue; in another, attached by its apex to the vault of the palate, and in a third, adhering, on the one hand to the placenta, and on the other to the head. Or, lastly, the heart may be depressed into the abdominal cavity, in consequence either of an opening through the diaphragm, or from the absence of that muscle. In the former case, if the abdominal parietes are complete, the individual may live for years, as in the cases related by Ramell‡ and Deschamps.§ When the abdominal parietes are incomplete, life cannot be prolonged, even if the child be born alive, as in Mr. Wilson's cases.||

3. *Malformations which do not permit the Mixture of Arterial and*

* Manuel d'Anatomie Générale, &c.

† Hist. des Anomalies de l'Organization.

‡ Journ. de Méd. de Chir. et de Pharmacie, 1778, vol. xlix. p. 423.

§ Journ. de Méd., vol. xxvi. p. 275.

|| Philosophical Trans., 1789.

Venous Blood.—These cases are rare, and of little importance, including examples of bifurcation of the apex, multiplication of the cavities, &c.*

IV. *Malformations which permit the Mixture of Arterial and Venous Blood.*—These are, of course, of much greater importance, and some of them will involve a more lengthened consideration. According to M. Berard, the following are the principal instances: 1. When the heart forms but a single cavity, into which the vessels open at once.† 2. When it consists of two cavities, an auricle and a ventricle, as in the cases of Wilson,‡ Standen,§ Faure, Mayer, Ramsbotham,|| Mauran,¶ and Breschet. 3. When the foramen ovale remains open. I shall return to the consideration of this latter case and its consequences presently. 4. M. Billard has included among the malformations of the heart, a narrowing of its orifices, which, however, may possibly have been the result of intra-uterine disease. He attributes it to a disproportionate growth in the heart and the orifices; *i. e.* the latter do not increase as fast as the former, and thence result various disturbances of the circulation, and certain æsthetic affections.**

Let us add, here, that during intra-uterine life the serous membrane of the heart and pericardium may be the seat of inflammation. I examined a foetus recently in which I discovered intense pleuritis and pericarditis. Organic diseases, also, are occasionally observed. Billard mentions a case of scirrhus; Denis, hypersarcosis; Cruveilhier, aneurism of the aorta; and Billard, aneurism of the ductus arteriosus, &c.††

CYANOSIS.

Before entering upon the examination of this disease, which appears to be the consequence of a communication between the right and left sides of the heart, through the open foramen ovale, it is necessary to inquire as to the period when this foramen is ordinarily closed, and the mode by which it is effected, as we shall be then better able to judge of the results of its non-obliteration. I must here avail myself of the minute and interesting observations of M. Billard.‡‡ He states that “out of nineteen infants of *a day old*, the foramen ovale was com-

* Paget on the Congenital Malformations of the Heart.

† Manual d'Anat., vol. ii. p. 305.

‡ Philos. Trans., 1798, p. 346.

§ Ibid. 1805, p. 228.

|| London Medical and Physical Journal, June, 1829.

¶ Philadelphia Med. Journ., Aug., 1827.

** Mal. des Enfants, p. 605.

†† Grætzner, Krankheiten des Fœtus, p. 160.

‡‡ Mal. des Enfants, p. 605.

pletely open in fourteen; in two, partially closed; and in two others, quite closed. In the same infants the ductus arteriosus was free and full of blood in thirteen; partially obliterated in thirteen; completely so in one. In the same infants the umbilical arteries were open near their insertion into the iliacs, but their calibre was diminished by a remarkable thickening of their parietes.

"Infants of Two Days old.—Of twenty-two, there were fifteen of whom the foramen ovale was very free; three in whom it was almost obliterated; and in four, entirely closed. In thirteen, the ductus arteriosus was free; in six, partially obliterated; and in three, completely so. In all, the umbilical arteries were more or less closed, but the umbilical vein pervious.

"Infants of Three Days old.—Of twenty-two, there were fourteen in whom the foramen ovale was quite open; in five its obliteration had commenced; and in three it was completely closed. The ductus arteriosus was free in fifteen; its obliteration had commenced in five, and was complete in two only; but in these two the foramen was closed. The umbilical vessels were empty and even obliterated in all.

"Infants of Four Days old.—Out of twenty-seven cases, in seventeen the foramen was open, and in six of them the opening was large and distended with blood; and in the remaining eleven, it was simply free; its obliteration was commenced in eight, and was complete in two. The ductus arteriosus was permeable in seventeen, partially closed in seven, and completely so in three. The umbilical arteries were obliterated near the umbilicus, but still dilatable near their iliac insertions. The umbilical vein and ductus venosus were empty and contracted.

"Infants of Five Days old.—Out of twenty-nine cases, thirteen had the foramen ovale open, but not equally so; it was nearly closed in ten, and effectively so in six others. The ductus arteriosus was open in fifteen; largely so in ten of them; partially obliterated in five; nearly completely in seven; and quite so in seven others. The umbilical vessels were closed in all.

"Infants of Eight Days old.—Of twenty cases, the foramen ovale was free in five only; it was incompletely closed in four; and completely so in eleven. The ductus arteriosus was obliterated in all except three; the umbilical vessels in all. We find from this last examination that the foetal openings are generally obliterated in eight days, but that we may find them free at that age, or even at twelve or fifteen days, without the child suffering in consequence.

"From the facts laid down before us, it follows that the foetal openings are not obliterated immediately after birth; that the period when this takes place is very variable, but that in eight or ten days the foramen ovale and the ductus arteriosus are generally closed.

"From our examination we find that the umbilical arteries are first obliterated, then the umbilical veins, next the ductus arteriosus, and lastly, the foramen ovale. The persistence of those communications for

some days after birth should not be regarded as a disease, seeing that it is very common, that it produces no ill effect, and that it is owing to the mode of obliteration."

I shall next present to the reader M. Billard's account of the mode in which this obliteration is effected, merely premising that his observations have been confirmed by M. Berndt, of Vienna. If any apology be necessary for such long extracts, it will, I trust, be found in their importance, and in the fact that they are unique. "If we examine the disposition gradually assumed by the foramen ovale, from a short time after conception up to birth, we perceive that the form of this opening, the arrangement of the surrounding parts, and especially of the Eustachian valves, becomes such that the blood, which at first flowed freely from one auricle into the other, meets by degrees with more difficulty in doing so. Sabatier has strongly insisted upon this point. Thus, then, a modification in the organization of the heart has forced the blood to modify its course; this fluid, inert by itself, is in immediate dependance upon the motor power which projects it, and directs it into the channels in which it ought to flow. If so, it follows that other changes will equally take place in those parts which the blood ought to forsake; anatomical changes which, altering the form and modifying the action of the organs, will impress a new direction upon this fluid. Now, if we examine the umbilical arteries and the ductus arteriosus, we shall find that in progress of obliteration their coats become thickened. This thickening of the umbilical arteries is especially remarkable at their insertion into the umbilicus; at that spot they often present, after birth, a fusiform contraction, which diminishes the calibre of the arteries, and is able to resist the force of the column of blood projected by the iliac arteries." . . . "Thus two causes force the blood, after birth, to abandon the course it took during intra-uterine life: 1. The establishment of respiration and the pulmonary circulation. 2. The modification of structure which the umbilical arteries undergo. Moreover, there is an experiment which proves that the contractility of the umbilical vessels can suspend the flow of blood through them. If we divide the cord, after birth, at some distance from the naval, the jet of blood is at first very strong, then it becomes slower, and afterwards stops altogether; and if we cut off another portion, the same phenomenon occurs. It is owing, of course, to the contraction of the arteries upon the blood: and if this contractility exist near the umbilicus and within the abdomen in a greater degree, on account of the greater amount of elastic tissue, one can understand the resistance they will be able to offer to the course of the blood in its more tranquil flow after birth. By degrees, as the infant grows older, the vascular tube is converted into a ligament.

"That which happens with the umbilical arteries is observed also in the ductus arteriosus. In the embryo it is as yielding as other arteries, easily dilated by the column of blood which flows through it, without

resistance, to the aorta. But at birth, and afterwards, its parietes become by degrees thicker, by a sort of concentric hypertrophy which diminishes the calibre without apparently diminishing the size of the vessel, and in consequence of this resistance the blood which is obstructed passes into the pulmonary arteries. At this period the duct presents the appearance of a pipe, whose walls are very thick and perforation very moderate." . . . "If it be necessary that the foramen ovale and the ductus arteriosus should undergo organic changes which prepare and lead to their obliteration, one can easily perceive that the modifications may sometimes be effected prematurely, in others, very tardily; so that on the one hand we find the foramen ovale closed soon after birth in some infants, or for a long time patent in others, and in most instances requiring some considerable but uncertain time for the completion of these changes. Thus we may explain the irregularity observed in the time at which an independent circulation is established, without considering it as the cause or effect of disease of the heart or lungs. However, the result will, no doubt, be an incomplete oxygenation of the blood, since all that the heart projects to the different parts of the body has not previously traversed the lungs, nor is in contact with the blood so renewed.

"But after all, is it necessary that the blood of a new-born infant should be as highly oxygenated as that of an adult? Is it not suitable that the recently completed and tender tissues of its organs should not receive blood too active—that the materials of nutrition should not be charged with principles too exciting, whose action upon the infantile organs might prove injurious to health, and even impede the progressive establishment of independent life? I think so, and see no reason for rejecting the opinions which result from the examination of the circulating system in new-born infants. These conclusions are supported by another consideration, viz.: that the lungs might be exposed to fatal congestions, if all the blood sent from the heart were conveyed to these organs by the pulmonary arteries. The ductus arteriosus, by allowing the superabundant blood to escape by it, relieves the respiratory organ, and permits a freer entrance of air into it than would take place if it were in a state of congestion, thus favoring the establishment of independent life by the persistence of those arrangements which were necessary during foetal life. Thus all is connected in a chain, the disposition of parts and the exercise of their functions; everything progresses in order, and by transitions foreseen and provided for, so that no sudden and unexpected change disturbs the harmony of the vital phenomena. If those openings persist much beyond the period already indicated, then, indeed, disease may be the result."*

After reading the valuable researches of M. Billard, we shall be

* *Mal. des Enfants*, p. 605.

better prepared to consider the disease in question, properly called "the blue disease," "morbus ceruleus," or cyanosis.

CYANOSIS consists in a blue, violet, or purple color of the surface of the body, and especially of those parts which are usually of a fresh or rose color, as the lips and other mucous surfaces, cheeks, &c.

The color is very marked in the face, hands, feet, and genitals, and less deep in other parts of the body, presenting the aspect of extreme venous congestion. It deepens during excitement or exertion, giving a very distressing appearance to the patient.

The extraordinary color, however, would be of little consequence, were it not that it is attended with other disturbances of a more serious character. The action of the heart is very subject to derangement upon the slightest excitement or exertion; the patient suffers from palpitation, fainting, &c., accompanied by *bruit de soufflet* or the purring sound; and there is, as we should expect, a marked disposition to serous effusions. The respiration is consequently and equally disturbed; hurried breathing, panting, dyspnœa, with a sense of suffocation, follow the least exertion, or occur in paroxysms without any cause. In fact, as Dr. Copland remarks, "it may be said that the disorder is made up of a succession of paroxysms and remissions. In the paroxysms alone we observe those frequent faintings, that tumultuous palpitation of the heart, and suffocation, which endanger the life of the patients. No rule can be relied on as to the recurrence of these paroxysms; in fact, if it be certain that they are brought on by over-exertion, fatigue, and violent mental agitation, it is equally certain that they occur without any assignable cause, and are more frequent in winter than in summer. The length of the paroxysm varies; it sometimes lasts several hours, and generally abates gradually. The termination of cyanosis is fatal to most patients, but some appear to recover entirely; others live for many years."*

Pathology.—One circumstance is common to almost all these cases, and is discoverable in making a *post-mortem* examination; I mean some mode of communication between the two sides of the heart. This may be effected in various ways:—

1. The foramen ovale may remain open or may have been reopened; and M. Gintrac† remarks that along with this patency there is generally an obstacle to the passage of the blood from the right auricle into the right ventricle, or more frequently from the right ventricle into the pulmonary artery. This obstacle he found in twenty-seven out of fifty-three cases; in twenty-six of the twenty-seven the impediment was in the pulmonary artery.

* Dict. of Pract. Med., part i. p. 200.

† Observations et Recherches sur la Cyanose, 1824. Paris.

2. The inter-ventricular septum may be perforated, as in some of M. Louis's cases.*

3. The ductus arteriosus may remain open, and, according to Louis, this is often coincident with the patency of the foramen ovale.

4. The two auricles may open into the right ventricle, as in MM. Gintrac's and Breschet's cases,† with perforation of the inter-ventricular septum, or, as Haller‡ mentions, with one auricle for the two ventricles. In one of M. Gintrac's cases, the two auricles opened into the right ventricle, between which and the left ventricle there was a considerable opening. The aorta took its origin from the left ventricle.

5. The pulmonary artery and the aorta may rise from the left ventricle, the right being almost obliterated, with a communication by means of the persistent foramen ovale, or perforation of the inter-ventricular septum. Holst, of Christiana, and Gintrac, have each related a case of this kind.

6. The insertion of one or all the pulmonary veins into the vena cava superior.

7. The presence of a second pulmonary artery arising from the right ventricle, and opening into the aorta; or supplying the place of the aorta, which was obliterated after giving off the cephalic and brachial trunks.

8. The transposition of arterial or venous trunks, as, for example, the implantation of the pulmonary artery upon the left ventricle, and the aorta upon the right, whilst the veins remain in their normal situation; or the opening of the veins into the left ventricle, the pulmonary veins, or even into the aorta.

9. The pulmonary artery may be completely obliterated.

10. The heart may consist of one auricle and one ventricle, as in the batrachiaë.

11. There may be two superior venæ cavæ, one opening into each auricle.

M. Louis has remarked the rarity of narrowing of the auriculo-ventricular, or the ventriculo-aortic orifices of the left side, he having met one case only, and that a slight one, in his twenty cases; whereas, in the same cases, there were ten examples of narrowing of the orifices of the pulmonary artery, and one of occlusion of the auriculo-ventricular communication by ossification of the tricuspid valves, which were perforated in many places. The narrowing of the pulmonary artery may be owing to the ossification of the sigmoid valves, united by their free edge, or to a species of diaphragm pierced in the centre, or by an approximation of the parietes of the artery to the corresponding ventricle.

* *Mémoires et Recherches Anatomico-pathologiques*, p. 328.

† *Répertoire Gén. d'Anatomie*, vol. ii.

‡ *De Monstris*, vol. i.

M. Louis conceives the changes to have been either malformations or the result of intra-uterine disease.

The condition of the heart itself is worth notice in these cases. M. Louis observes that, with one exception, his twenty cases were all examples of aneurism of one or more of the cavities of the heart. Dilatation of the right auricle occurred in nineteen cases, with hypertrophy in six, and thinning of the walls in two. The right ventricle was dilated in ten cases, hypertrophied in eleven, and in five the hypertrophy and dilatation were coincident. But the left auricle was dilated only in three cases, hypertrophied in two, and the left ventricle dilated in four, and hypertrophied in three cases.* M. Bouillaud states that the volume of the heart was augmented in eleven out of fifteen cases, and that in the majority of cases it was owing both to hypertrophy and dilatation of the right cavities. In ten cases the right auricle was dilatated, in five of them it was hypertrophied also; in five others it is not stated; in five there was hypertrophy; in five others it is not stated. In ten cases the right ventricle was hypertrophied, and the hypertrophy was concentric.† M. Bouillaud has also mentioned that in four of his cases the pericardium contained from three ounces to a pint of serum; in two cases it was mixed with flocculi of albumen, and in one case there was false membrane and granulations on the surface of the right auricle.

There is some difference of opinion as to whether the communication between the two sides of the heart is congenital malformation, or the result of accident or disease. M. Louis, who has examined the question with his usual minute care, has arrived at the conclusion that it is an original malformation; but M. Bouillaud thinks that the perforation of the inter-auricular or inter-ventricular septum may have taken place from causes which have left no traces. M. Ferrus‡ also objects to attributing all the cases to original malformations, because of the sudden development of the consequences, which he thinks could not have been so long postponed if the cause had been longer in existence. M. Fabre,§ however, very justly replied to this, that he has often dissected children in whom these malformations existed, but in whom the symptoms never occurred. He differs from M. Louis, in thinking the absence of any traces of disease about the opening a conclusive proof that it is a malformation; and he concludes that in the majority of cases the communication is congenital, especially between the auricles, but that the perforation of the inter-ventricular septum is sometimes accidental.

* *Mem. et Recherches Anatomico-pathologiques*, p. 334.

† *Traité des Mal. du Cœur*, p. 685.

‡ *Dict de Méd.*, en 30 vols., vol. ix. p. 536.

§ *Bibliothèque de Méd. Prat.*, vol. v. p. 379.

The effect of this intercommunication one would suppose to be the immediate mixture of red and black blood, or the reduction of the heart to the condition of a single one; but such is not invariably nor necessarily the case. There will probably be no mixture of blood, although the foramen ovale be open, unless there be hypertrophy and dilatation of the right side of the heart, with narrowing of the auriculo-ventricular opening; and in like manner it will require a narrowing of the arterial orifices to occasion a mixture of blood where the ventricles communicate. And the coincidence of these changes is not unfrequent. M. Jules Cloquet and M. Bouillaud agree pretty nearly with the view of M. Louis, that when the foramen ovale remains open, the ductus arteriosus is pervious, the aorta springs from both ventricles jointly, and when to the communication between the right and left side of the heart there is superadded an obstacle to the free current of blood in the former, a considerable quantity of black blood must, of necessity, mix with the red. The endocardial murmurs which are occasionally present are, no doubt, due to the narrowing of the auriculo-ventricular or arterial orifices, or to regurgitation.

But are we to conclude that the discoloration of the skin is owing to the mixture of arterial and venous blood? M. Louis says: "It is, then, impossible to maintain, either from reason or experience, that the blue color is due to a mixture of black and red blood, and the more that it appears that this mixture occurred in almost every case, whereas the blue color was by no means constant. Let us add, with M. Fouquier, that the skin of the foetus, in which black blood circulates, is not blue." He adds: "Morgagni seems to have given the true explanation in the case which we have quoted from him. To account for the livid color, he remarks that the constriction of the orifice of the pulmonary artery, in consequence of ossification, must have caused great embarrassment of the circulation; that the blood stagnated in the right ventricle, right auricle, and consequently in the entire venous system." Corvisart seems to doubt whether the blue color is owing to this admixture of blood. M. Billard states that cyanosis is not the invariable result of the persistence of the foramen ovale, or the passage of the venous blood into the arterial system, inasmuch as there are many cases in which this took place without such results; but it is probably due either to this mixture or to deficient oxygenation of the blood, whether there be intercommunication, or whether the blood be incompletely changed in the lungs. M. Bouillaud expresses a similar opinion; he regards cyanosis as essentially due to a deficient oxygenation of the blood, whether the structure of the heart be perfect or not. The late Dr. Stillé thought that no *one* lesion is to be considered as the anatomical character of cyanosis, but that it depends simply upon any cause, which, acting at the centre of the circulation, will produce a stasis of blood in the capillary system. Dr. Chas. D. Meigs regards cyanosis as asphyxia resulting from black blood in the brain, and not

we know but very little, as it is the acute symptoms which generally attract attention.

Again, it may be either *primary* or *secondary*, the former being exceedingly rare. It is seldom met with in adults, according to Dr. Latham, and still more rarely in children. Our chief knowledge of the disease in the living subject is drawn from those cases in which it occurs in the course of other diseases, such as rheumatism, the eruptive fevers, pleurisy, &c.

Dr. West has given a case of idiopathic or primary pericarditis, which I may be excused for copying, on account of its rarity and interest. The subject of it was "a healthy boy, eleven years old, who, on May 8, 1843, complained of feeling cold, and began to cough. The chilliness was succeeded by fever, and he continued gradually getting worse till the 13th, when I visited him for the first time. He had had no other medicine than a purgative powder. On May 13th, I found him lying in bed, his face dusky and rather anxious, his eyes heavy, and his respiration slightly accelerated; coughing frequently, but without expectoration; skin burning hot, and pulse frequent and hard. He made no complaint, except of slight uneasiness about the left breast. On examining the chest, there was found to be very extended dulness over the heart, with slight tenderness on pressure. A very loud and prolonged rasping sound was heard in the place of the first sound, loudest a little below the nipple, though very audible over the whole left side of the chest, and also distinguishable, though less clearly, for a considerable distance to the right of the sternum. The second sound was heard clearly just over the aortic valves, but was not distinct elsewhere, being obscured by the loudness of the bruit. Respiration was good in both lungs. The child was cupped to ʒvi . between the left scapula and the spine, and gr. i. of calomel, with the same quantity of Dover's powder, was given every four hours. On the following day, it was found that the sense of discomfort in the chest had been relieved by the cupping, and that the child had slept well in the night. He looked less anxious, though his eyes were still heavy and suffused, and his skin was less hot and less dusky. His pulse was 114, thrilling, but not full. There was now slight prominence of the cardiac region, and the heart's sounds were obscurer and more distant than on the previous day. The bruit was now manifestly a friction sound, louder at the base than at the apex of the heart, and altogether obscuring the first sound, while the second sound could be heard over the aortic valves. Six more leeches were applied over the heart, and the hemorrhage from their bites was so profuse as to occasion some faintness. Mercurial inunction was now superadded to the treatment previously employed, and the child's condition continued through the 15th to be much the same as it had been on the previous day. On May 16th, there was some improvement in the general symptoms, and the pulse was softer. The friction sound was now no longer audible, but a loud

rasping sound was heard in the place of the first sound. The second sound was now distinguishable at the apex of the heart, as well as over the aortic valves, and its character was quite natural. On the 17th, the mouth was slightly sore, and the dose of the remedies diminished. On the 22nd, the soreness of the mouth was considerable, and all active treatment was discontinued on that day. The child gradually regained his strength, but the bruit accompanying the first sound continued, and was heard a month afterwards, with no other change than being rather softer and more prolonged. Four years afterwards, I saw him again. He had continued well in the interval, and had never suffered from palpitation of the heart, nor from any other ailment referable to the chest; but his pulse was small, jerking, and not always equal in force, and the natural character of the first sound was altogether lost in a loud, prolonged bruit.”* This case is of great value, both on account of the accurate picture of the disease it presents, and from its simple character and history.

The characteristics of the heart disease are pretty much the same, whether as a primary or secondary affection.

Symptoms.—The symptoms of pericarditis are not very striking, and in infants are necessarily more obscure than in adults, because a very young child's expression of pain or uneasiness is always more or less confused. When it occurs in the course of other diseases, also, our attention may be so fixed upon the important primary affection, that we may overlook the slight but essential changes which mark the incursion of a new disease. No better illustration could be given of the value of a rule which I have adopted for many years, and which I strongly recommend to my readers, viz: when first called to see a child, no matter for what disease, to examine every organ of the body, and to repeat this examination at intervals of a few days. By so doing we shall often ascertain the commencement of secondary affections before they give rise to any complaint of distress.

Probably the earliest symptom we shall notice of the disease in question will be uneasiness or pain in the left side of the chest, in the præcordial region, near the left mamma; this pain will be expressed if the child be old enough, or if not we may detect it by the position in bed, the restrained inspiration, the suffering on percussion, or on being moved. In Constant's, Mayne's, and Billard's cases it was pretty severe; in Puchelt's, not very acute; and in Rilliet and Barthez's cases it occurred but rarely, and was not severe. It will be less marked, or at least less pathognomonic, when the primary disease is pleurisy or pneumonia; but in fever or rheumatism any uneasiness in the left side of the chest ought at once to excite our suspicions, and direct our most careful attention to the state of the heart.

* Lectures on Diseases of Infancy and Childhood, p. 307.

The respiration, too, has a peculiar character in general; it is not the dyspnoea of obstructed lungs, nor is it any form of cerebral respiration, but it is high, rapid, yet restrained and suffocating, with quick movement of the *alæ nasi*, and a difficulty of speaking sentences, as though the interruption to the short, quick inspirations, necessary in speaking, were intolerable. This again will be masked if there exist any pulmonary disease, but in other cases it is very striking.

If there be no disease of the lungs, there will be but little cough, if any, but when these organs are affected, we may be at a loss to separate and distinguish the symptoms peculiar to each disease. Palpitation, owing to irregular action of the heart, is seldom troublesome, but the violent action of the organ is sometimes felt in a distressing manner. The pulse is very quick, strong, and wiry. The face has an anxious, drawn, distressed, almost frightened expression; in two cases Billard observed spasmodic movements of the limbs; the child cries often, as if suffering extremely, and generally objects to lying flat down in bed.

But all these signs would only excite our suspicions that some grave lesion existed; they afford us no precise information as to its nature. This we can only obtain by a careful estimate of the physical signs; but then it is satisfactory to know that these are amply sufficient. The natural sounds of the heart are dull or muffled, though generally distinguishable. This obscurity increases for some days, occasionally varying; its maximum is just beneath the mamma, and it appears to depend either upon the effusion of fluid, or upon the exocardial murmurs occasioned by the disease. In eight out of nine cases related by Rilliet and Barthez, both sounds were obscure; in one, one of the sounds only. Although the sounds are muffled, they are not weakened, but, on the contrary, may even be louder than natural, with increased impulse. The exocardial murmurs are thus described by Dr. Williams: "Those of pericarditis are various sounds of superficial friction, which are quite characteristic. At first this sound is soft and rustling, like the rubbing together of two pieces of paper or silk stuff; and it may accompany only part of the natural sounds, from which, however, it is obviously distinct, in being much more superficial. It is generally heard first about the middle of the sternum, or to the left of it, corresponding with the base of the heart or the attachment of the auricles; it afterwards increases in loudness and duration, being heard beyond the immediate region of the heart, and accompanying not only the periods of the natural sounds, which it disguises, but also the interval between them. It thus gets a sort of continuous jogging rhythm, corresponding with the movements of the heart, which is like that of the saddle when one rides on horseback; and when, as it generally happens, the friction sound becomes harder, and more like the creaking of leather, its resemblance to the noise of a new saddle is quite ridiculous. In some cases the noise is crackling, like that of crumpled dried

membrane or parchment. These friction sounds are certainly caused by the rubbing of lymph on the pericardium proper, and on its sac.”*

When effusion takes place, so as to separate the opposing surfaces of the pericardium, these friction sounds, are, of course, impossible, so that they are heard chiefly during the early stage of the disease, and again when the process of absorption has removed the principal portion of the fluid, except in those cases where there is little effusion. The sounds are generally audible in whatever position the child may be placed, but in two cases Rilliet and Barthez found them more evident in a sitting posture. Along with these exocardial murmurs we occasionally hear a *bruit de soufflet* accompanying the first or second sound of the heart, but this does not result from pericarditis, but from coincident endocarditis, of which I shall speak presently. If the effusion be small, the respiratory murmur will be audible in the pericardial region, but if large, the lungs will be, to a certain extent, displaced.

Dulness on percussion is another sign of considerable value; it is almost always more absolute than usual in the præcordial region, but its extent will depend upon the amount of effusion. When this is considerable, the dulness will be proportionably extensive, and not only so, but the præcordial region acquires a degree of prominence; the intercostal spaces are protruded, and subside as the effusion is absorbed.

Thus the physical signs of pericarditis are muffled sounds and increased force of the heart, exocardial murmurs, dulness on percussion, and fulness or prominence of the præcordial region. I have already mentioned that the pulse is quick, the skin is hot and feverish, the tongue loaded or white, the appetite lost and the bowels often disordered. In other words, the entire constitution sympathizes with and suffers from the diseased condition of its central and most important organ.

Cases, however, occur in which the symptoms are much more obscure, nay, which may hardly indicate the region affected. My dear friend, the late Dr. Hunt, gave me the notes of the following case, which strikingly illustrates the fact: “George M'Donnell, æt. seven months, a large healthy child, awoke screaming from sleep, about 6 A. M., on Monday morning. He was bathed and fomented without relief. On Monday Dr. Hunt saw him, and found the state of the skin, abdomen, and his general appearance, natural. He drank freely, but not greedily, and without pain or difficulty; pulsation of the fontanelle regular; respiration high, apparently painful, but not difficult; the alæ nasi were not in movement, nor was there any heaving of the chest. After crying continuously for some minutes, he would then give two or three screams. This state continued until 8 A. M. of Wednesday, he having never slept more than a few minutes the whole time. At

* Diseases of the Lungs, p. 235.

died on the evening of the 19th. His symptoms on admission were these: Skin hot and dry; tongue moist and white; pulse 140 and jerking; swelling, and slight redness, and pain of the right wrist and hand, but of no other part of the body; breathing hurried and short, with a slight cough; pain in the præcordial region, increased by pressure between the ribs, and by deep inspiration; excessive impulse of the heart; inability to lie on the left side. Auscultation found the lungs admitting air freely in every part, and at a circumscribed part beneath the cartilages of the third and fourth ribs on the left side, the systole of the heart was heard, accompanied by an unnatural sound of an indefinite kind. The sound was lost when the stethoscope was removed from this spot in the least degree." The boy had had an attack of rheumatism a year and a half before, with inflammation of the pericardium, and after death there was found evidence of two distinct inflammations occurring at distant periods; certain old, firm, close adhesions, and, in other parts, recent lymph deposited on the surface.

3. Lastly, we may have not merely a difference in the extent of adhesions, but in the quantity of uniting medium. Sometimes we find a thin, slight tissue interposed, in other cases one of half an inch in thickness; and every intermediate degree. Now this must be an impediment, and an incurable one, to the accurate performance of the heart's functions, though compatible with life; and moreover, the pericardium in this condition is peculiarly exposed to the perils of secondary inflammations.

4. So much for the organic changes, the consequences of pericarditis, with their dangers; but in pericarditis we have irritations of other organs complicating the primary disease. For example, various and severe nervous symptoms sometimes arise. "Wild delirium, epileptic or tetanic convulsions, chorea, coma, fatuity, are the greatest and the rarest; and muttering, reveries, transitions from torpor to excitement, subsultus, are the least and most frequent. But they are all akin to one another. The least may mount up to the greatest, and the greatest run down to the least."*

Morbid Anatomy.—The morbid changes discovered by dissection, resemble closely those of other serous membranes; the pleuræ, for example. The membrane is found occasionally injected, either generally, giving it a pale rose color; or in patches, or resembling ecchymoses. Its surface is generally polished and smooth, but in one case Rilliet and Barthez found it thickened and rough. The increase of thickness generally described is probably due to the layer of false membrane deposited upon the serous surface, and the erosions or ulceration, as in Schmidel's case, to depressions in this adventitious layer.

A quantity of serum is almost always the result of inflammation. The amount varies a good deal; in general it is not very abundant; in

* Latham on Diseases of the Heart, p. 18.

children from two or three to six or seven spoonful. When the inflammation is very intense, it will be more abundant; generally yellowish, sometimes greenish yellow, like whey mixed with flocculi of lymph. But besides serum there is generally a layer of false membrane on one or both serous surfaces, of varying thickness and tenacity, but more firm and dense the longer the standing of the disease. It may, however, be limited to one serous fold, or it may occur in patches, granules, or filaments, connecting the two surfaces. When the disease becomes chronic, the fluid is absorbed, leaving the false membrane as the only evidence of the pericarditis. Unfortunately, as I have already stated, more or less intimate and extensive adhesion takes place between the opposite surfaces of the pericardium; but as this is rather a reparative process, we do not generally observe it in those who have died of pericarditis, but in those who, having recovered from that attack, either become victims of a second or of some other disease.

In secondary attacks of pericarditis, we find the old, firm, close adhesions in some parts, whilst in others there are patches of recent lymph, or small collections of puriform matter. The irregular white patches, which are so commonly observed upon the pericardium of children as well as of adults, have been proved by Dr. Paget, to be the result of circumscribed chronic inflammation. Rilliet and Barthez mention having once found the interposed false membrane of a semi-cartilaginous character.

Causes.—Pericarditis is more common, according to Rilliet and Barthez, in children above six years of age; in all their cases, with one exception, were from seven to fifteen years, and more above than below eleven years. Puchelt, however, quotes cases of one, two, three, and four years. I have seen the disease in an infant under a year old; and we have had Dr. Todd's testimony that it is not unfrequent in infants. Whether sex does really influence the predisposition to the disease it is difficult to say; but of Rilliet and Barthez's twenty-four cases, twenty-one were boys and three girls.

Puchelt attributes much influence to hereditary predisposition, and among direct causes he enumerates blows, falls, cold, &c. Billard conceives that its occurrence in young infants may be owing to the extra activity of the heart on assuming an independent life.

But a much more important point for our investigation is the diseases during whose course pericarditis is most apt to occur; in other words, the primary diseases to which the present affection is secondary. This is of unusual importance, because we find that secondary pericarditis is by far the most frequent, and if we know the diseases in the course of which we may expect it, we shall be prepared to detect, and to treat it in its earliest stage.

1. Bouillaud considers pericarditis and endocarditis to be essentially a part of rheumatism in the adult; and though Dr. Williams does not go so far, he states that he has found signs of one or other in three-fourths of the cases of severe rheumatism he has examined in the last

six years. Dr. Latham's experience is also to the same effect; and such appears to be pretty much the case with rheumatism in children. Rilliet and Barthez found pericarditis in four cases out of eleven of acute rheumatism; and Dr. West mentions it as the most frequent accompaniment of this disease. He adds also the following very important practical observations: "It is of importance, however, to bear in mind, that the risk of cardiac mischief supervening in any case of acute rheumatism increases in direct proportion to the youth of the patient, and that the mildness of the general symptoms, the small amount of pain in the limbs, and the almost complete absence of swelling of the joints, afford no guarantee that the heart may not become the seat of the most serious disease. It happens, too, less rarely in the case of children than of the adult, that the general indications of rheumatism follow instead of preceding the heart affection; so that fever, with hurried circulation and distinct endocardial murmur, may exist for two or three days, before the occurrence of pain and the appearance of swelling of the joints show that the disease of the heart is only a part of the great malady which has attacked the whole system."*

2. It may also occur in the course of infantile remittent, although, as in rheumatism, it is more frequently endocarditis than pericarditis.

3. The eruptive fevers occasionally give rise to it; thus it may occur in the course of scarlatina, as first noticed by Vieussieux and Wells, or measles.

4. We sometimes find it apparently the result of other diseases of the chest, from which it may probably have extended, owing to the contiguity of the tissues affected. Thus, it is not very rare to find it complicating pneumonia and pleuritis. Dr. West mentions three such cases, and I have seen similar ones.

5. It sometimes appears to be the result of morbid changes in the blood, caused by other and more distant diseases, as, for instance, Bright's disease of the kidney; and in such cases it may arise only shortly before death, as in a case related by Dr. Latham.†

6. I have already mentioned that in chorea the heart often becomes the seat of secondary inflammation.

This cursory enumeration of diseases which may be complicated by inflammation of the membrane of the heart, may well impress us with the necessity of watchfulness, and of repeatedly examining into its condition in all such cases. Much of our success will depend upon the early detection of the disease, and we may often overlook it if we wait until the symptoms force it upon our attention.

Diagnosis.—If we trusted to symptoms alone, our diagnosis would

* Lectures on Diseases of Infancy and Childhood, p. 304.

† Lectures, &c., on Diseases of the Heart, vol. i. p. 358.

be often inexact, although even then we could have no doubt of the existence of a very serious thoracic affection; but when, in addition, we are able to examine the chest with the stethoscope, we shall generally make out the disease correctly. The distress referable to the region of the heart, the hurried respiration, the difficulty of lying down, the exocardial murmurs, the dulness on percussion, and the increased impulse of the heart, are the characteristic signs and symptoms of the disease.

The only diseases with which there is much danger of our confounding it are *pleuritis* and *endocarditis*.

1. From the former it is distinguishable by the limited extent of the dulness, the locality of the friction sounds, and the free permeable condition of the lungs, and the resonance of all parts of the chest except the præcordial region. When complicated with pleuritis, we shall have all the signs of each disease present.

2. In endocarditis the symptoms are very similar, but the endocardial murmurs are essentially different, and indicate some obstruction to the current of the blood. But the two diseases are frequently combined, and then, in addition to the friction or crackling sound of pericarditis, we have the souffle of a narrow valvular orifice. In simple endocarditis there is no increase of dulness on percussion.

Prognosis.—Although a very serious disease, yet pericarditis is not as frequently fatal as we might *à priori* suppose; nay, a considerable number recover when the disease is partial. When the inflammation is acute and general, of course the danger is very much greater, and is aggravated by the existence of the primary disease; yet even of such cases a proportion recover. Rilliet and Barthez saved their four cases of rheumatic pericarditis. In forming our prognosis, we must take into careful consideration the age, strength, constitution, and previous history of the patient, with a due estimate of the primary disease and its effects. Dr. Latham has so strikingly shown the danger dependent upon the constitution of the child in such diseases as the present, that I need make no apology for extracting some of his observations: "It goes hard with weak, scrofulous children, and with men and women whose habitual health is no better than an habitual infirmity, when they come to suffer inflammation of any vital organ; but it often goes still harder with them after the inflammation has ceased, if much be left for reparation. Subjects of this unhappy constitution will struggle through a combined attack of inflammation of the heart and lungs, and hold out well until it has come to an end, and will afterwards die during the halting, ineffectual efforts of reparation, or only after a very long time and many vicissitudes, will reach the point of safety at last. Their constitution has given all that it could to the disease without dying, and it has now not enough, or scarcely enough left to give for reparation, or rather for that degree of reparation which is needed for present safety."

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Treatment.—Fortunately the treatment of pericarditis is simple and intelligible, so that, having ascertained the nature and stage of the injury, we have only to bring our remedies to bear upon it promptly. The indications of cure are to abate the inflammation, to moderate the violent action of the heart, and at a more advanced stage to promote absorption. Each remedy I shall mention will, if successful, accomplish more than one of these objects.

When called to a case of acute pericarditis, whether primary or secondary, the first thing is to take away some blood, either from the arm or by cupping or leeching, if the child will bear it, and in proportion to its strength. If the heart disease be primary, it will bear it well, and not only once, but twice or three times, if necessary. If the disease be secondary, and the primary disease have not much reduced the child, blood must be taken: in almost all cases of rheumatism, for instance, there will be no counter-indication. But when the child has been run down by measles, scarlatina, pleurisy, &c., or was originally of a weak, scrofulous constitution, we must be more cautious; perhaps three or four leeches may be borne, applied to the præcordium, or if not, we must then depend upon calomel and opium, with counter-irritants.

Calomel alone, or in combination with a small quantity of opium, squills, or digitalis, is next in value to bleeding. We should commence its exhibition in all cases immediately, and proportioning our dose to the age of the child, the state of the bowels, &c., and guarding against diarrhœa, we should endeavour to bring the child as quickly as possible under its influence. Mercurial inunction may be used at the same time that calomel is given internally, and both should, if possible, be continued until either soreness of the gums or mercurial diarrhœa gives proof that the constitution is affected. In the first instance the mercury is employed for its antiphlogistic properties, but afterwards it may be continued in smaller doses, or resumed, for the purpose of removing the fluid effused into the pericardium. Dr. Latham has some valuable observations upon this subject, to which I gladly refer the reader.*

As an adjunct to these remedies, and especially for the purpose of quieting the inordinate action of the heart, digitalis has been recommended, and it has the additional advantage of acting as a diuretic. It may be given either in powder, infusion, or in tincture, but its effects must be carefully watched, and, if necessary, the medicine suspended. It is better to commence with small doses at first, say a drop or two, three times a day, for a child of a year old, and gradually increasing it according to the effects. The German writers recommend its combination with the calomel, or we may add a little squills to it by way of securing the action upon the kidneys. If digitalis cannot be borne,

* Diseases of the Heart, vol. i. p. 260, *et seq.*

Rilliet and Barthez recommend the nitrate of potash, to which Puchelt adds Glauber's salts and cream of tartar, with absolute repose, low diet, and moderate warmth.

Counter-irritation is of considerable value when the first acuteness of the disease is subdued, after bleeding, &c., and also subsequently, to promote absorption of the fluid; and the best mode is to apply a small blister for a short time, and repeat it near to the former.

The bowels must be kept free, but severe purgation should be avoided. Let the child be kept perfectly quiet, both mentally and corporeally; there should be no attempt to enforce discipline; and those who are in health may patiently bear with and humor the caprices of a child suffering under so distressing an affection. The child must be kept in bed, conveniently clothed, and in the position it finds most comfortable.

The diet must be antiphlogistic, with some modification in the case of children who are much worn down, or of weak constitution.

I would most strongly advise my readers who wish to obtain a practical knowledge of this disease to study carefully the chapter on the subject, in Dr. Stokes' admirable work on Diseases of the Heart, &c.

CHAPTER III.

INFLAMMATION OF THE LINING MEMBRANE OF THE HEART. ENDOCARDITIS.

ENDOCARDITIS, or inflammation of the membrane lining the heart, seems more common than pericarditis, both in adults and children, though they are frequently combined. Rilliet and Barthez record sixteen cases, and in two others the disease existed, but was only discovered after death.

The attack may be either *acute* or *chronic*, the latter fully as frequent as the former, and either *primary* or *secondary*, the latter being, as in the case of pericarditis, much more common than the former, and more frequent than primary pericarditis, according to Dr. West.

Symptoms.—The phenomena which indicate the commencement of endocarditis, are very slight and obscure; a slight febrile movement which subsides in a little time; the respiration somewhat accelerated, and possessing the peculiar character I noticed in pericarditis; obscure pain in the præcordial region; and some difficulty in lying upon the

left side, may be all the symptoms developed; on which account it becomes of great moment to watch those diseases in which it is apt to occur, that we may detect its commencement. "In cases of acute rheumatism," says Dr. West, "you are aware of this danger; you do not wait till the patient's sufferings inform you that the mischief has been done, but you are on the watch against the first threatenings of its approach: and your sense of hearing gives you earlier information and surer information concerning this than all the other signs together. But if the same evil against which you guard thus sedulously in cases of rheumatism, may occur independently of it, and may scarcely give warning of its approach until it is almost, or altogether, too late to cure; a measure, at least, of the same precaution, should be observed at all times; and in no instance of febrile disturbance in early life, how simple soever the case may seem, should you consider the examination of the patient complete without auscultation. With all your care, there will, probably, still be cases in which the commencement of the heart affection will escape your notice; in which you will accidentally make the discovery of its existence when auscultating the chest for some other purpose, or in which the gradual supervention of the signs of valvular disease will call your attention to it long after the ailment has become chronic."*

The physical signs are pretty decided and characteristic. The sounds of the heart are energetic and regular, though hardly so clear as usual, and with the first sound there is a *bruit de soufflet*, either distinct from the contraction, or more or less masking it. It is heard generally in the mammary region, sometimes clearer at the apex, and in other cases at the base, and extending upwards, according as the tricuspid or mitral valves may be the principal seat of the disease. This endocardial murmur may be heard at the commencement of the attack, and, unless in those rare cases where the return to health is complete, the *souffle* will remain for a long time as evidence of an injured heart. As pericarditis often co-exists, exocardial murmurs may accompany the *bruit de soufflet*, indicating the complex character of the disease, but ceasing long before the sounds from the diseased valves disappear. In simple endocarditis the præcordial region is not more dull on percussion than usual.

But from the obscurity of the symptoms, and the slight constitutional disturbance, the disease may run on into the chronic form before we are consulted, and then we shall be at once presented with the phenomena of the disease, and of some, at least, of its consequences, mixed, very likely, with the symptoms of the primary disease, whether bronchitis, pneumonia, pleurisy, or fever. There is generally more or less cough, sometimes dry, in other cases with expectoration; the respi-

* Lectures on Diseases of Infancy and Childhood, p. 308.

ration is also accelerated, partly owing to the primary disease, but principally to the affection of the heart. The breathing is panting, hurried, and as if a moment's interruption would be followed by suffocation. The pulse is always quick, small, and thread-like; sometimes, though by no means always, the patient complains of pain or uneasiness in the region of the heart. The surface is seldom hot, although in some cases there are abundant perspirations. Rilliet and Barthez have not found the face so characteristic as in adults; sometimes the *alæ nasi* were in action, and in all the countenance expressed anxiety and suffering. In some cases the child can lie on either side, but in most I think it requires to be propped up by pillows. A large proportion of cases suffer from anasarca, partial or general. Rilliet and Barthez met with it in nine out of twelve cases. Other and more distant consequences of the condition of the heart I shall describe presently.

The physical signs are those which indicate injury of the valves of the heart, and the results of such injury, dilatation or hypertrophy, or both. The heart's action is more extensively heard than usual; sometimes dull but energetic; in others, and perhaps more frequently, clear and superficial. Ordinarily they are distinct, but sometimes confused and running into each other. Mental emotion or sudden movement occasions violent palpitations. In all cases a *bruit de soufflet* accompanies or immediately follows the first sound of the heart. Heard from the beginning, it persists after the patient has apparently recovered, or until death, if the disease prove fatal. Unlike acute endocarditis, when the *chronic* form has continued for some time, there is a diminution of resonance on percussion, amounting in many cases to absolute dulness, and much more extensive than natural.

The following case, given by Dr. West, affords an excellent picture of this form of disease: "Nothing could be more gradual than the advances of the early stages of the disease of the heart in the case of a little girl, eleven years old, who came under my notice in the month of March, some years ago. Her mother stated that, though not robust, she had never had any definite illness, but that for the last year she had been growing thinner, and had suffered from palpitation of the heart, which had by degrees become more and more distressing, and that for the past three months she had suffered likewise from cough. The child, when brought to me, was greatly emaciated; her face was anxious and distressed; her breath short, so that it was with difficulty that she walked even a short distance. She had frequent short cough, without expectoration, and she suffered much from palpitation of the heart, and a sense of discomfort at the chest. The heart's action was violent; dulness in the præcordial region was extended; a very loud, harsh, rasping sound accompanied the first sound of the heart, loudest towards and to the left of the nipple, but heard over the whole of the chest, both before and behind. Various remedies brought slight but temporary relief to her sufferings, and she grew worse every month.

She became more and more emaciated; the distress at the chest and the palpitation of the heart increased; her cough became more violent, and once she had an attack of hæmoptysis. For about a month before her death the cough altogether ceased, but she was now altogether unable to leave her bed from increasing weakness; the palpitation continued unmitigated, and her extremities became slightly anasarcaous. During the last week of her life, her respiration was extremely difficult, and became increasingly so till she died on the 10th of October. The lungs were very emphysematous, and much congested, but not otherwise diseased. The heart was extremely large, but its right cavities did not exceed the natural size. The pulmonary valves were healthy, the edges of the tricuspid valve were slightly thickened; the left auricle was enormously dilated, but its walls were not at all attenuated; the pulmonary veins were much dilated; the left ventricle was dilated, its walls were thickened; the chordæ tendineæ of the mitral valve were greatly shortened, so that the valve could not close; the valve itself was shrunken, thickened, and cartilaginous; and there existed likewise a slight thickening of the edge of the semilunar valves of the aorta.*

Such or such like is the history of those cases of endocarditis, which, giving rise to injury of the valve and consequent hypertrophy, run a fatal course within the space of some months; incipient obstruction to the circulation, constant dyspnœa, palpitation, exhaustion, emaciation, and death. But all do not necessarily thus terminate. The patient may recover, *i. e.*, her life may be saved, with an injured heart, and in this exact condition it may remain for five or six years, neither improved nor getting worse, suffering from palpitation, dyspnœa, and some pain on exertion or mental emotion. "The child who has had the præcordial murmur ever since it suffered a certain rheumatic attack, is just the same child it was before, except that it cannot join in any pastime requiring rapid movement, for then its heart palpitates, it loses its breath, and is obliged to sit down."† Dr. Latham adds: "I have lately seen a young lady, thirteen years of age, whom I attended three years and a half ago, under an attack of acute rheumatism attended by endocarditis. The symptoms during the attack referable to the heart were completely characteristic of the disease, and carried to such extremity as to keep life in peril for several days. It was, perhaps, the severest case I ever saw recover. She did recover, however, but never lost the murmur and occasional palpitation. At present she has the appearance of perfect health; she even bears the marks of premature womanhood. She goes to school, plays about like other girls, but cannot run so fast or so far as the rest, or use bodily exertion beyond a

* Lectures on Diseases of Infancy and Childhood, p. 309.

† Latham on Diseases of the Heart, vol. ii. p. 89.

certain amount, without dyspnœa and palpitation, and some pain in the region of the heart. For all other purposes she is absolutely well. In examining the state of her heart when she is quite free from all excitement, I find no extraordinary impulse either of extent or of degree. It is felt only at the apex. Neither do I find any extraordinary extent of dulness on percussion. A systolic murmur is audible everywhere within the præcordial region, most audible at the apex, more faintly at the base. From the basis upwards towards the right clavicle, in the course of the aorta and subclavian artery, it is entirely lost; towards the left clavicle, and in the course of the pulmonary artery, it is very loud, but not at all heard in the carotids. From the apex the murmur extends far round towards the left axilla and the back. Here I presume that the rheumatic inflammation has done a permanent injury to the endocardium on both sides of the heart, and that the mitral valve and the semilunar valves of the pulmonary artery have undergone change of structure." The same author mentions the case of two young ladies in whom similar evidence of valvular injury had existed from childhood, but whose health has never suffered in consequence, and he asks: "Do not these facts give intimation of a certain *protective* power, probably inherent in the *growing* heart, whereby it can accommodate its form and manner of increase to material accidents, and to repress or counteract the evil tendencies?"

I have a little patient in whom I accidentally detected a *bruit de soufflet* with the first sound of the heart some years ago, without being able to trace the disease to its commencement. Like Dr. Latham's case, his health does not appear to suffer, and the heart disease remains stationary.

Consequences.—But this is far from being the general result of such cases. There are certain consequences which seem to be the necessary effect of permanent disease of the valves from endocarditis.

1. I should first mention, however, that the lining membrane of the heart, once having been the seat of inflammation, seems as liable as the pericardium to a repetition of the attack; with this difference, however, that the signs indicating it, the palpitation, dyspnœa, impossibility of lying down, strong impulse, and loud murmur, are much more characteristic and definite than those of secondary attacks of pericarditis. Both Dr. Latham and Dr. West mention cases of this kind, with a melancholy foreboding of the future history of such cases. "The valvular disease, and the heart's efforts to overcome its consequences, have already led to a considerable degree of hypertrophy of the organ; the danger of each acute attack will be aggravated by the old disease, and every fresh inflammatory seizure will add to the chronic mischief, until, in the course of time, the disorganization of the heart will have advanced so far as to render it unable to perform its office sufficiently well to maintain existence any longer, and a life of suffering will then be closed by a painful death."

2. Attenuation and softening of the left ventricle, either alone or combined, may be the result of valvular disease, giving rise to a feeble impulse but loud sounding action of the heart, and to other and deeper derangements of the circulation, near or distant and of a passive character, such as effusion of serum or blood, congestions, &c.

3. But a more common result, with children at least, is the production of hypertrophy with dilatation, *i.e.* when the substance and size of the heart are both increased, the cavities, or some of them, are larger than natural, and the walls are thicker. The left ventricle and auricle are most frequently the seat of this morbid change. There can be no doubt that it is the result of valvular injury, and that it is a kind of reparation at the same time; an obstacle existing to the passage of the blood, an increase of force is required by the heart to overcome it, and to prevent the consequences of such interruption. "A loud, systolic, endocardial murmur, and an excessive impulse of the heart, and a larger space of præcordial dulness than natural there, are the sure and authentic signs of an injured valve, and hypertrophy of the left ventricle."* But the rhythm of the heart's action may be perfectly regular, and the pulse betray no sign of the existing mischief. The general circulation, too, may be perfect, and the color and heat of surface quite natural.

4. But although in itself, and to a certain extent, a process of reparation, this augmentation of size and force may become a deadly evil in its result. The most common effect of this state of the heart is the effusion of serum into the cellular membrane, first of the lower extremities, then of the body, upper extremities, and face. In some cases, similar effusion may take place into the serous cavities with alarming results.

5. Again, a child laboring under hypertrophy of the heart is liable to congestion, hemorrhage, or inflammation of different and distant organs, of an active character, and attended by very serious consequences. The same diseases apparently as those from attenuation, but of an opposite character, and requiring a different treatment, they seem, upon the whole, more manageable.

Morbid Anatomy.—The morbid changes from endocarditis are not so numerous nor so marked as in other serous membranes, for the very obvious reason that the current of blood must sweep away with it all the serum which may be effused, and a great portion of the lymph; still, enough remains to afford evidence of the disease, now that we know what to seek for. On opening a heart which has suffered from this disease, we find the lining membrane vascular, and of a red color generally, or in parts when the inflammation is recent. A certain amount of coagulable lymph is deposited upon the valves, either in patches or

* Latham on Diseases of the Heart, vol. ii. p. 296.

like small beads. The mitral valve is the most frequent seat of these depositions, then the tricuspid. At a later period, there may be no vascularity nor any traces of recent lymph, but the valves are thickened, irregular, retracted, or incomplete, sometimes cartilaginous, and occasionally, but rarely, osseous. Now and then there are vegetations upon them, or the chordæ tendineæ may be shortened. Whatever be the peculiar modification of the lesion, the effect is to render the valves less pliable, less capable of closing the orifice, or of yielding to the current of the blood; hence the endocardial murmur, and the remote consequences of obstructed circulation.

When the valvular disease is of old standing, we may find hypertrophy and dilatation about equally frequent, according to Rilliet and Barthez, who also mention that they have found the hypertrophy limited to the inter-ventricular septum, and to the columnæ carneæ in connection with diseased valves.* The tissue of the heart is almost always in its normal condition, red and firm. In one case only, Rilliet and Barthez found it soft, flaccid, and of a yellowish red.

Causes.—It is extremely difficult to specify the causes of endocarditis, except in general terms, inasmuch as we see so little of the disease except as a secondary affection. It does not appear that either age or sex have much if any predisposing influence. Of eighteen patients mentioned by Rilliet and Barthez, affected with acute or chronic endocarditis, the numbers of boys and girls were equal.

It is as a *secondary* disease, however, that its principal interest consists, and the primary affections in which it occurs are the same as those enumerated when speaking of pericarditis, with which it is very often combined.

1. The most common primary disease is acute rheumatism, at any stage of which the heart may become affected. We may easily detect its invasion, if we are on the watch. The increase of the heart's action, the hurried respiration, the anxiety of the countenance, and the endocardial murmur, will at once indicate the new and formidable enemy with which we have to grapple.

2. I have seen it come in the course of infantile remittent quite suddenly. A few hours before, the child was going on very well, without any local affection, when suddenly, dyspnoea, very quick pulse, pain in the chest, and *bruit de soufflet*, made their appearance.

3. In like manner, we may find it complicating any of the eruptive fevers, especially scarlatina and measles, when we least expect it, and without any warning. On this account, let me repeat the advice already given, to look carefully to the heart at each visit in all these diseases.

* Mal. des Enfants, vol. i. p. 220. Dr. Hope on Diseases of the Heart, 3rd edition, p. 203, *et seq.*

4. The hypertrophy and dilatation result naturally, and to a certain extent, as a reparative process, from the obstruction offered to the circulation, and the necessity of an increase of force to overcome it. Rilliet and Barthéz mention that deformity of the chest (from rachitis) may give rise to hypertrophy, as it certainly may to considerable confusion in the heart's sounds.

Diagnosis.—There is perhaps less difficulty in the diagnosis of endocarditis than of pericarditis, and there is not much danger of their being confounded. We may certainly overlook either when both are combined, but practically this would not be of much consequence.

The general symptoms are much the same, but the presence of endocardial murmurs, the *bruit de soufflet*, *de scie*, and *de rape*, with the first chiefly, or with both sounds of the heart, and the absence of the friction sound, will render the diagnosis clear. At an early stage, the dulness is less absolute and less extensive in endocarditis, and the patient suffers more from palpitation. In the chronic stage, we have the murmurs, an increase of dulness, œdema or anasarca, with palpitation upon the least exertion.

There is a class of cases among young persons about puberty which seems a little puzzling at first. I allude to those in which *bruit de soufflet* and other murmurs are heard in the heart and large vessels, not from valvular disease, but from some change in the component parts of the blood, *e. g.*, in patients in a state of anæmia. This I have often found in young women laboring under amenorrhœa; but we have the satisfactory testimony of Dr. West that it is not the case with children under seven years of age, and that at a later period it is very rare.

Prognosis.—The prospects of the patient are always very serious and doubtful. They may recover from immediate danger, and life may be safe for the present, and even, in some rare cases, for years; but sooner or later, it is to be feared that some of the consequences I have enumerated will either terminate life or render its continuance a burden.

Treatment.—The treatment of endocarditis is almost identical with that of pericarditis. When acute, bleeding, general or local, calomel, digitalis, and diuretics; with counter-irritation subsequently, are all the means at our disposal. As I have entered fully upon their employment in pericarditis, there is no occasion to do so now, as what was then said applies to the present disease just as well.

The necessity for absolute quiet is even greater, or, at least, more obvious, in endocarditis; for mental emotion, disturbance, or exertion, increase the dyspnœa and palpitation to a most distressing degree.

A second attack of inflammation must be met in the same way, but, perhaps, less actively, according to the condition of the patient, and certainly with less hope of being successful.

Whether any means at our command are sufficient to arrest or con-

trol the hypertrophy and dilatation is at least doubtful, but by judicious regimen we may often prevent inconvenience, and by timely and well-considered treatment may relieve some of the consequences, such as anasarca, local congestions, &c. Diuretics for the removal of effusions, calmants for tranquillizing the action of the heart, and local antiphlogistics in moderate degree, will at least afford a chance of relief, and of the prolongation of life.

SECTION IV.

DISEASES OF THE DIGESTIVE SYSTEM.

CHAPTER I.

INTRA-UTERINE DISEASES. CONGENITAL MALFORMATIONS.

A CONSIDERABLE variety of intra-uterine diseases of the digestive system have been observed and recorded. Thus Orfila, Veron,* Cruveilhier,† Billard, and others, speak of muguet observed at birth, and evidently existing during intra-uterine life. Cases of œsophagitis have been mentioned by Billard‡ and Orfila; of gastritis by Siebold,§ Billard, and Orfila; of peritonitis and enteritis by Weisberg,|| Chaus-sier,¶ Veron,** Duges,†† Billard, Canes, Cruveilhier,‡‡ Simpson,§§ and others.

Numerous cases of infants born jaundiced are on record. Some of the mothers had jaundice, others bowel complaints, &c. Panarola,||| Kerkring,¶¶ Schurig, Schultz,*† Wrisberg,*‡ Sentin,*§ Billard, and

* Séance de l'Acad. Roy. de Méd., June 28, 1825.

† Anat. Pathol., liv. 15, p. 13.

‡ Mal. des Enfants, p. 274.

§ Journal für Geburtshülfe, vol. v.

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¶ Bull. de la Faculté de Méd. 1821, vol. x.

** Recherches des Mal. des Nouveaux-nés, 1821.

†† Gynæcologie, vol. ii. p. 251.

‡‡ Anat. Pathol., liv. xv. pp. 2, 3.

§§ Edin. Med. and Surg. Journal.

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*† M. N. C. Dec. 1. An. 6, 7, p. 355.

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others, have described such cases. Billard* has seen tubercular granulations, and Orfila mentions that the liver is occasionally hypertrophied, fatty, tuberculous, transposed, softened, or indurated.†

It is enough for my purpose thus slightly to prove the existence of morbid actions *in utero*, analogous to those observed in after life, thus completing the circle of disease. With those whose effects continue after birth, and with certain malformations or arrests of development, affecting as they do the comfort or even the life of the child, I must enter more into detail. I shall, in the remainder of the chapter, notice hare-lip and cleft palate, which are arrests of development, and imperforate anus, which is a malformation. These are of too much importance to be omitted, although the reader will find them fully treated in every systematic work on surgery. For most of the information I have been indebted to Mr. Cooper's invaluable Dictionary.

HARE-LIP.—This congenital deformity consists of a perpendicular or oblique division of the upper lip, either directly below the septum of the nose or one of the nostrils. The upper lip, thus divided, is generally movable, but in some cases the two portions are closely attached to the alveolar process. The space between the divided portion varies; sometimes it is considerable, in other cases but slight. But the cleft is occasionally double, constituting what is called "double hare-lip," and in such cases we find a small portion of the lip in front between the fissures. In a great many cases the arrest of development is confined to the lip; in other cases it extends along the soft parts of the palate even to the uvula; and in others the bones of the palate are incomplete. Again, the jaw may be incompletely ossified in front, leaving a cleft between; or one portion may project more than the other. The lower lip may also be affected, but this is a very rare malformation.

Every one, probably, has witnessed the deformity occasioned by the simplest form of hare-lip, which is much aggravated when it is double. But there is more than deformity resulting, for it often hinders an infant from sucking, and at a later period interferes with the facility and perfection of speech. All these evils are greatly worse when the lower lip is fissured, and even the health may suffer.

Treatment.—It is evident that this deformity can only be remedied by a surgical operation; and as all mothers are naturally anxious to have it relieved as soon as possible, the first question relates to the age at which the operation should be undertaken.

The earlier the age at which it can be done safely the better, but then it must be remembered that very young infants are very liable to convulsions, and on this account it is generally deferred until the child is about two years old. Sir Astley Cooper sanctioned this, having known

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a fatal result from operating earlier. Mr. Cooper mentions having successfully operated upon a child of five months old, and upon another a year old. Le Dran, B. Bell, and others, operated upon infants even at earlier ages; and Dupuytren has fixed upon three months as the most favorable age.* My friend, Surgeon Smyly, who has had great experience in this operation, has favored me with the following note illustrating the point in question:—"The infant on whom you saw me operate for hare-lip was two months old. I removed the needles the third day; I, however, applied adhesive plaster, to prevent accidents. The child has been able to suck well since. In cases of single hare-lip I always prefer operating early; the operation is much easier of performance, as the child can make no resistance, the wound heals faster, and deformities of the nose and palate are more easily redressed when the patient is very young, and before teething has commenced. I have looked over the notes of some cases: one, the youngest I ever operated upon, was only a fortnight old, the others from one to four months. In none of them have I seen any unpleasant symptom to deter from operating early. I never saw convulsions follow in any case operated upon for hare-lip, and hemorrhage is as easily controlled in the young infant as in an older child. I generally take the precaution of compressing the coronary arteries with Dieffenbach's forceps. In looking over my notes I was surprised to see so many cases in which the cleft was on the *left side, i. e.* in three-fourths of the cases." Dr. O'B. Bellingham, Prof. R. Smith, Dr. Butcher, and others, agree with Mr. Smyly in preferring an early age for the operation, but other surgeons of this city, prefer a later period.

Whatever be the time chosen for operating, all surgeons are agreed that the object is to reduce the fissure to the condition of an incised wound, by removing the edges of the divided portions, and keeping them in contact until adhesion takes place. There has been some difference of opinion as to whether this approximation should be effected by sutures or by adhesive plaster and bandages. M. Louis offered a weighty opposition to the sutures, but notwithstanding, the twisted suture is now generally used. "No modern surgeons doubt that a hare-lip may be cured by means of adhesive plaster and uniting bandages quite as perfectly as with a suture; and all readily allow that the first of these methods, as being more simple and less painful, would be preferable to the latter, if it were equally sure of succeeding. But it is considered far more uncertain in its effect. To accomplish a complete cure, the parts to be united must be maintained in perfect contact until they have contracted the necessary adhesion, and how can we always depend upon a bandage for keeping them from being displaced? What other means, besides a suture, afford in this respect perfect security?"†

* Clin. Chirurg., vol. iv. p. 90.

† Cooper's Surgical Dictionary, p. 656.

When about to perform the operation with the twisted suture, we should first examine whether the lip be adherent to the gum, and if so they must be separated by the knife. When the frenulum is in the way of the operation it must be divided. "In the operation for single hare-lip," says Mr. Cooper, "the grand object is to make as smooth and even a cut as possible, in order that it may more certainly unite by the first intention, and of such a shape that the cicatrix may form only one narrow line. Hence in this country the edges of the fissure are cut off with a sharp knife. One plan is to place any flat instrument, such as a piece of horn, wood, or pasteboard, underneath one portion of the lip, and then, holding the parts stretched and supported on it, to cut away the whole of the callous edge. Another is to hold the part with a pair of forceps, the under blade of which is much broader than the upper one; the first serves to support the lip, the other contributes also to this effect, and at the same time serves as a sort of ruler for guiding the knife in an accurately straight line. When the forceps are preferred, the surgeon must of course leave out of the upper blade just as much of the edge of the fissure as is to be removed, so that it can be cut off with one sweep of the knife. This is to be done on each side of the cleft, observing the rule to make the new wound in straight lines, because the sides of it can never be made to correspond without this caution." In University College Hospital the margins of the fissure are usually removed by transfixing the lip with a long, sharp-pointed, narrow bistoury, just above the upper end of the cleft, and then cutting towards the red portion of the lip, while the part is held and stretched out by the surgeon himself or his assistant. One side of the cleft is thus pared off, and then the other, particular care being taken to remove a small piece of the red part of the lip on each side, lest an ugly notch should be left in that situation. This is the plan ordinarily followed by Mr. Liston. In France the edges of the fissure are always taken off with a pair of strong, sharp long-handled scissors, invented for that purpose by M. Dubois.

Two silver pins, made with steel points, which admit of an easy removal, are next to be introduced through the edges of the wound, so as to keep them accurately in contact, the lowest pin being introduced the first, near the inferior termination of the wound, and the upper pin afterwards, about a quarter of an inch higher up. A piece of thread is then to be repeatedly wound round the ends of the pins, from one side of the division to the other, first transversely, then obliquely, from the right or left end of one pin above to the opposite end of the lower one, &c. Thus the thread is made to cross as many points of the wound as possible, which greatly contributes to maintaining its edges in even apposition. Lastly, the steel points of the pins are to be taken off, or if not made to slide off, they are to be supported by small dossils of lint, placed between them and the skin. In the University College Hospital Mr. Liston employs largish common needles, the heads of which have been dipped in sealing wax, and after they have trans-

fixed the lip, he takes off their points with a pair of cutting forceps. "Instead of pins made with steel points, Dr. Barton, of Philadelphia, prefers using a piece of iron wire, with a point made by simply cutting it with a pair of scissors. Thus he avoids the risk of the steel point slipping off the pin and remaining within the lip." "It is obvious that a great deal of exactness is requisite in introducing the pins, in order that the edges of the incision may afterwards be precisely applied to each other. For this purpose some surgeons previously place the sides of the wound in the best position, and mark with a pen the points at which the pins should enter and come out again. The pins ought never to extend more deeply than about two-thirds through the substance of the lip, and it would be a great improvement always to have them of a flat instead of a round shape, and a little curved, as this is the course which they naturally ought to take when introduced. The steel points should also admit of being easily taken off when the pins have been applied, and perhaps having them to screw off and on is the best mode, as removing them in this way is not so likely to be attended with any sudden jerk, which might be injurious to the wound, as if they were made to pull off. In general the pins may be safely removed in about four days, when the support of sticking plaster will be quite sufficient. After the operation, compresses and a bandage for keeping forward the cheeks are sometimes employed, but they may in general be dispensed with, because irksome to children, and the occasion of restlessness." This is what is called the *twisted* suture, and is the most generally used for hare-lip; but there are other circumstances and other modes of operating which require a moment's notice.

It occasionally happens that there is a considerable projection of the upper jaw (especially when the hard palate is divided), sufficient to offer a serious obstacle to the union of the two portions of the lip. The ordinary practice has been to remove this portion, but as that destroys the harmony of the upper and lower jaw, it has been proposed and practised successfully by Desault, Dunn, and others, to employ compression first so as to reduce the prominence to its proper level, and then operate for the hare-lip. M. Gensoul in a case seized the projection with a strong pair of forceps, and brought it down into its place by main force. "M. Dupuytren had a peculiar method of operating in some cases of complicated hare-lip. He observed that when the labial tubercle was inserted very close to the point of the nose, its union to the lateral parts drew the lip upwards, and exposed the gums and teeth, while the nose itself was pulled down and flattened in a most ugly manner. Hence he conceived that it would be better to employ the labial tubercle in forming the lower part of the partition of the nose, and to unite at once the lateral portions of the lip. He first divided with a bistoury the fold of mucous membrane uniting the labial tubercle to the osseous one, and then, with a pair of cutting forceps, removed all such portions of the latter as projected beyond the anterior

level of the jaws. He next pared off the sides of the cutaneous tubercle and its lower edge. These things having been done, the vertical margin of the fissure on each side was cut off with a pair of scissors. The two lateral portions of the lip were now brought together and united with two pins; and the fresh cut bleeding middle tubercle was laid over the bony partition of the nostrils, of which it was to form the lower portion. A third pin was applied, so as to include at once the upper end of each part of the lip, and the loose extremity of the reflected tubercle. Lastly, two interrupted sutures united the angles of this tubercle to the lateral portions of the lip. The sutures were assisted with straps of adhesive plaster and a bandage that made pressure on the apex of the nose, so as to keep the flap from being too much stretched.”*

Instead of the twisted suture Sir Astley Cooper preferred the common interrupted suture, on account of the danger of separating the new adhesions when withdrawing the pins. The threads of the common suture can be cut and easily removed. When the hare-lip is double, the operation is the same in principle, and had better be completed at once instead of making two operations, as the older surgeons advised.

Occasionally hare-lip is complicated with cleft palate, and now and then, after the hare-lip is cured, this fissure closes; in other cases there must be some artificial substitute contrived. This brings us to the second of the malformations.

CLEFT PALATE.—There are three degrees or forms of this congenital malformation: first, when the fissure is simple, and confined to the soft palate; secondly, when there is a partial division of the bony palate; and thirdly, when this division involves a greater or less interspace between the lateral portions, and almost always a fissure in the alveolar process and the upper lip. The operation for each respectively has been termed *staphyloraphy*, *staphyloplastie*, and *uranoplastie*.

Staphyloraphy.—Mr. Cooper describes MM. Roux’s and Berard’s, Mr. Smith’s, and Mr. Liston’s method of performing this operation.

In M. Roux’s plan, the apparatus required consists—1. Of three broad flattish ligatures, composed of three or four strong threads. 2. Of six small, curved, flat needles, two for each ligature. 3. A *porte-aiguille*. 4. A pair of dressing forceps. 5. A probe-pointed bistoury. 6. Scissors with long handles and short blades, bent laterally to an obtuse angle.

“The patient being seated opposite the light, and the mouth kept open, the surgeon takes hold of the right edge of the fissure with the forceps held in his left hand, while with the right he conveys into the pharynx the *porte-aiguille* armed with a needle, the point of which is of course turned forwards. The point of the needle is then carried back

* Cooper’s Dictionary, p. 657.

to the posterior surface of the velum, and passed through it from behind forward near the lower end of it, and about three or four lines from the margin of the slit. The point of the needle is to be passed out as far as practicable, and then taken hold of with the forceps. The *porte-aiguille* being now removed, the needle is drawn into the mouth with the forceps, and along with it the ligature with which it is threaded. After the patient has recovered his tranquillity, and washed out his mouth, the other end of the ligature is to be passed in a similar way through the left side of the velum, and the two ends are to be brought out at the commissures of the lips. Then a second ligature is to be applied near the angle where the two sides of the velum meet, and a third at the middle point between the other two ligatures. The left side of the fissure is then seized, depressed, and rendered tense with the ring-handled forceps, and the excision of its margin begun with the curved scissors, and completed with a straight probe-bistoury applied on the outer side of the forceps, and with its back directed towards the root of the tongue. Thus a slip is to be removed about half a line in breadth. Particular care must be taken to let the slip extend a little above the front angle of the fissure. The same proceedings are to be followed on the opposite side, the two incisions being made to join at an acute angle above the point just now specified. It only remains to tie the ligatures. The surgeon begins with the lowermost one, which is first to be tied in a simple knot. As soon as this has been duly tightened with the forefinger, it is to be taken hold of with the ring-handled forceps, and kept from slipping until another knot is made. The same plan is to be adopted with the two upper ligatures. Finally the ends of each ligature are to be cut off as useless." No other dressing is requisite: the patient must avoid all exertion of the part, such as laughing, talking, sneezing, and even swallowing, as much as possible. The upper ligatures may be removed on the third or fourth day; the lower ones should remain a day or two longer. If the union be not complete, the edges may be touched with the nitrate of silver.

M. Berard's method is apparently more simple. With the left hand he seizes the left border of the fissure with a *tenaculum*, and with the right he passes a curved needle, held by the forceps and armed with a ligature, from before backwards, on a level with the upper angle, until its point can be seized with the forceps, when it is drawn through. Another ligature is passed in like manner through the opposite edge, and as many ligatures are thus inserted as the fissure requires, and then the edges of the fissure are removed and the ligatures tied.

Mr. N. R. Smith, of the United States, employs a curved needle mounted on a handle, and armed with a ligature. The front of the needle is passed from behind forward until the ligature appears, and can be seized with a *tenaculum* and drawn through. The needle is then withdrawn, and passed through the other side of the fissure. After a sufficient number of ligatures have been inserted, the sides of the velum

are to be tightened by means of them, and the edges removed by scissors or knife. The ligatures are then to be tied.

Mr. Liston's method is as follows: A narrow, sharp-pointed knife, held by the further end of the handle, is introduced through the edge of the fissure at its anterior margin, and run back to the apex of one-half of the uvula. This may be laid hold of and made tense by means of the sharp-pointed forceps. The same proceeding is repeated on the other side. The ligatures are introduced with needles fixed in handles, and of different sizes and curvatures, the eyes being near their points. They are passed through the velum about a quarter of an inch from its free edge and towards it, and through two-thirds of its thickness. Each needle carries a double ligature, the noose of which is caught by a blunt hook and pulled out into the mouth while the instrument is withdrawn. A second and smaller ligature is carried through opposite to the first, and by means of this second thread the first and double one is brought through. By a repetition of this plan two, three, or more points of interrupted suture are made. After the edges have been brought together by one or two points, no difficulty will be experienced in carrying others through both edges by means of a more curved instrument in a handle, or by the use of a small needle carried in the points of a pair of strong and well-fitted forceps. Before the ligatures are finally secured, the parts being put upon the stretch, an incision should be made on each side towards the alveolar ridge, through the anterior surface of the velum. By this method Mr. Liston finds that the edges may be more easily brought together, and the strain is taken off the threads, so that there is less risk of their making their way out by ulceration. Mr. Liston deems the operation very liable to failure.*

In two cases upon which Sir Philip Crampton operated in the year 1842, that distinguished surgeon deviated from the ordinary mode of securing the ligatures, and from the usual treatment subsequently. Mr. Hamilton, who relates the cases, observes: "The difficulty of tying the second knot on the ligature without suffering the first to become opened by the strong retraction of the edges of the fissures, effected by the muscles of the palate, has always been acknowledged. This difficulty, however, was effectually removed by an ingenious suggestion of Mr. M'Clean's, of Stephen's Green. After the ligatures had been passed through the palate at the distance of one quarter of an inch from the cut edge of the fissure, and brought out at the mouth, their ends were passed through a small perforated metallic bead, such as are used in making purses. The bead was then pushed down along the ligatures, closing them as it descended, until it touched the approximate edge of the wound; it was then compressed by a pair of strong, blunt-pointed

* Liston's Practical Surgery, p. 472.

forceps, and the ligatures were thus firmly secured without a knot, at the required degree of tension. The other and most important peculiarity in the treatment consisted in allowing the patient an ample supply of soft food during the whole period of the treatment. Boiled bread and milk, custard, soup, and jelly, were given twice or thrice a day, and the patients were not confined to their beds.”*

Professor Fergusson, of King's College, London, has proposed a modification of this operation, founded upon a more careful investigation of the anatomy of the parts.† He regards the action of the levatores palati and the palato-pharyngei muscles as an obstacle to the closure of the fissure, and he proposes to obviate this retraction by dividing these muscles. “As a preliminary step to the ordinary operation, I suggested the division of the levator palati on each side, and also, if it seemed needful, of the posterior portion of the fauces, whereby large portions of the palato-pharyngei might be cut across. I also then thought that the anterior pillars, each containing the palatoglossus, might possibly require division. To effect these different incisions, I used a small peculiarly curved blade for the levator muscle, and common curved scissors for the others.”‡ Mr. Fergusson prefers a free incision through both mucous membrane and muscle. “I still retain the opinion that there is no better mode of introducing the stitches than by means of a slightly curved needle set in a handle. The point of the instrument, armed with a smooth round waxed silk thread, is passed from below upwards, about a quarter of an inch from the cut margin of the fissure, and made to appear in the middle of the gap, when the thread is seized with the forceps, drawn three or four inches out of the mouth, and then the needle is withdrawn. A similar manœuvre is followed on the opposite side. The two threads are then tied together by the ends which have been thus drawn out of the mouth, and by withdrawing one of them the other will be carried through the aperture opposite to that where it was first introduced. Hitherto, the thread has been double; now one end must be drawn through the apertures and out at the mouth, and so the thread is ready to be tied. Two, three, four, or five threads are introduced in this way, and then, after the cut margins of the flaps are sponged free of blood and mucus, the various threads are fastened.” Mr. Fergusson prefers “a moderate degree of tightness, rather than that the edges should be kept asunder by saliva or mucus.” He also agrees with Sir Philip Crampton in allowing the patients the use of fluid food.

In Roux's experience, two-thirds of the simple cases, and one-third of the complicated, derived benefit from the operation. Dr. Mütter, of

* Dublin Journal, Jan. 1843, p. 324.

† Trans. Royal Med. Chirurg. Society, vol. 27. Practical Surgery, p. 530.

‡ London Journal of Medicine, No. 1, p. 21.

Philadelphia, succeeded in nineteen out of twenty-one operations; Dr. J. M. Warren, of Boston, in thirteen out of fourteen; Mr. Fergusson has given a notice of twenty-four cases, in which the operation was performed according to his suggestions, in twenty-one of which it was successful.*

Staphyloplastie.—Dieffenbach's method of performing this operation consists in making an incision along the palate on each side of the fissure, and afterwards drawing the edges together by ligatures. The Indian staphyloplastie consists in raising up a flap of soft parts from the roof of the mouth, and twisting its pedicle round, so that the flap may be adapted by means of suture to the loss of substance in the palate. I must refer my readers to the different writers on surgery for the various attempts which have been made to remedy this defect by the substitution of an artificial palate. If it be necessary at all, it is at least desirable to wait until after the age of puberty, and therefore the subject hardly comes within the scope of a treatise on diseases of children.

IMPERFORATE ANUS.—In this malformation the lower portion of the intestine terminates in different ways, which materially affect the operation for its relief and the results. 1. The anus may be closed by a thin membrane, the rectum being perfect; in such cases the membrane generally projects, the blue color of the meconium is discernible, and there is a feeling of fluctuation or something very like it to the touch. 2. The rectum may terminate an inch or so above the anus, and there will then be no projection, the skin will retain its natural color, and the parts will feel firm and solid. 3. Sometimes the intestine does not descend lower than the upper part of the sacrum. "Dr. Palmer dissected a case where the colon, after reaching the vicinity of the left kidney, began, as it descended, to form a sigmoid flexure, but, previously to its arrival at the concavity of the left ilium, made a sudden turn to the right, and crossing the posas muscle, reached the projection of the sacrum, where it terminated without entering the sacrum at all. With this malformation was combined an imperforate meatus urinarius and other considerable deviations of the genital organs from the natural structure."† 4. Occasionally the colon terminates in a *cul de sac*, the rectum being entirely wanting. 5. Although the anus may be perfect, yet if there be a closure of the rectum by membrane higher up, as sometimes happens, the result will be the same. 6. In any of these cases there may be an attempt to afford relief naturally by an opening into the bladder, as in a case under my care, or into the urethra, in the male, or vagina in the female. In a fatal case lately under the care of Dr. Sawyer, of this city, and of which he has made

* London Journal of Medicine, No. 2, p. 117.

† Med-Chir. Journal, 1816, vol. i.

a careful dissection, he found that the rectum opened into the urethra, anterior to the membranous portion.

We can easily understand that this malformation must speedily be attended with very serious or fatal consequences. If relief be not afforded, the infant perishes with symptoms of strangulated hernia. Mr. A. C. Hutchinson recommends that the operation should be deferred until from twenty-four to sixty hours after birth, the advantage being, that the intestine being distended by the meconium, will be a guide to the operator in making an incision. At all events, within a moderate time after birth, an attempt must be made to afford relief by evacuating the contents of the intestine.

When the anus is merely closed by a membrane projected downwards by the meconium, whose color is discernible, the operation is simple, and consists in making a crucial incision through the centre of the prominence and removing the corners. After the rectum is emptied the wound must be kept open by a portion of a bougie, elastic gum catheter, or what I found to answer equally well, a small glyster-pipe. It is little matter what means are used, if the end be attained.

But when no external appearance denotes where the anus ought to be, and when the touch gives us no information, the case is much more difficult, inasmuch as we know not how far distant the intestine may be from the surface, and consequently are ignorant how far we may have to penetrate before relief be afforded. "However," as Mr. Cooper observes, "it is the surgeon's duty to do everything in his power to afford relief. For this purpose, an incision an inch long, or rather more, is to be made in the situation where the anus ought to be, and the wound is to be carried more and more deeply in the natural direction of the rectum. The cuts are not to be made directly upwards, nor in the axis of the pelvis, for the vagina or bladder might thus be wounded. On the contrary, the operator should cut backwards along the centre of the concavity of the os coccygis, where there is no danger of wounding any part of importance. In all cases of this kind the surgeon's finger is the best director. The operator, guided by the index finger of his left hand, introduced within the os coccygis, is to dissect in the direction above recommended, until he reaches the fæces, or has cut as far as he can safely reach with his finger. If he should fail in finding the meconium, as death must unavoidably follow, one more attempt ought to be made by introducing upon the finger a middle-sized trocar in the direction, but calculated to reach the rectum, without danger to other parts, viz: upwards and backwards in the median line. The canula may be left in the puncture, and secured there with tapes, so as to afford an outlet for the fæces. In some observations on this subject, addressed to the Medical and Chirurgical Society by Mr. A. Copland Hutchinson, he recommends an elastic gum catheter to be substituted for the canula, after a week; and when the tube can be dispensed with, a sponge tent, or a piece of bougie, to be worn twelve out of the twenty-four hours." M. Wolff, after cutting to the depth

of two inches without finding the gut, was enabled to reach it by means of a pharyngotomus, and the child recovered.

The great difficulty appears to be to prevent the wound closing. Mr. Bell states that it was only by most assiduous attention for eight or ten months that he obviated the necessity for another operation. Mr. Miller, of New Haven, had to repeat the operation ten times before the child was eight months old. In the case under my care I had to repeat the operation once, and by great care it has perfectly recovered. A portion of a catheter, or bougie, a short glyster-pipe, or, in short, any matter which can be maintained in the wound, and which reaches into the intestine, will answer the purpose.

If the obstacle should be high up, the anus being perforate, we must endeavour to ascertain its nature and extent; if it can be relieved by dilatation well and good, if not it must be divided either with a blunt-pointed bistoury or a pharyngotomus, and the opening maintained by a bougie.

When, in addition to an imperfect or imperforate anus, there is an opening into the bladder, vagina, or urethra, the best remedy for the latter is making the former more free; the more fæces pass through the anus the less will escape by the supplementary passage; it is rarely necessary to do more. In my case the fæces passed by the urethra before and a few days after the operation; but as the one passage became more free, the other ceased to be used altogether.

The attempts to remedy this formidable defect do not appear to have been as successful as we might have hoped; by far the larger number of children die after the operation, but how far the operation has a share in the mortality it would be difficult to say. A small number recover, and I am inclined to think that those upon whom the operation is performed with the least delay have the best chance. The little boy upon whom I operated is now ten years old and healthy. A case of recovery is related recently by Dr. Thompson, of Tennessee,* and one by M. Jacobs.†

But suppose that we cannot reach the intestine in the way already pointed out, and that we must conclude that there is some extraordinary malformation, as in Dr. Palmer's case, what is to be done? If we do nothing the child's death is certain, therefore some risk may very properly be incurred. In 1720 M. Litere proposed to make an artificial anus by opening into the sigmoid flexure of the colon, above the left groin. M. Dumas tried this plan in 1788, but the infant died. In 1793 it was practised with complete success by M. Duret, of Brest, and M. Pilore, of Rouen. Dessault, Ouvrard, and Roux, lost the cases in which they tried it.‡ "The operation consists in making an incision

* Philad. Med. and Surg. Journal, Aug. 15, 1853, p. 81.

† Association Journal, May 25, 1855.

‡ Velpeau, *Nouv. Elém. de Méd. Operat.*, vol. iii. p. 983.

a little above Poupart's ligament, about two inches in length, and on the outer side of the curve of the epigastric artery : the skin, superficial fascia, aponeurosis of the external oblique muscle, the lower fibres of the internal oblique and transverse muscles, the fascia transversalis, and the peritoneum, are to be divided in succession. As soon as the peritoneum has had a small puncture cautiously made in it, a director is to be introduced into the opening, which is to be enlarged with a probe-pointed bistoury. The distended bowel, of a livid or greenish color, presents itself in the wound, and, being opened in the same direction as the wound, a tent or piece of full-sized elastic gum catheter should be placed in the new passage. The introduction of a ligature through the mesentery is sometimes advised, but as my observations apply only to opening the sigmoid flexure of the colon, such expedient is out of the question.”*

Though we may be justified in having recourse to the operation as a *dernier ressort*, the results do not seem to afford much hope of success.

CHAPTER II.

DENTITION.

BEFORE we proceed to examine into the consequences of severe dentition, it may be as well to lay before the reader the ordinary course of dental development, in which medical interference is rarely necessary.

Meckel, Sims, and others, agree that the formation of the teeth commences at a very early period of embryonic life, by an ossific deposit upon the pulp, which is extended and developed from without inwards, so that the grinding surface and shell of the tooth are first formed, with a central cavity, which gradually diminishes as the osseous matter increases, to form the body: last of all the roots are formed. The teeth are inclosed in a capsule consisting of two lamellæ, from the union of which the pulp is developed; and the entire, at birth, are inclosed in and covered by a considerable thickness of gum. The membrane which secretes the enamel invests the crown of the tooth, and adheres firmly to its neck. As ossification advances, the crown of the tooth rises, and the membrane of course accompanies it. On the tubercles and cutting edge of the tooth the crystallization of the enamel is first completed, and the process continues until the neck is reached; the membrane covering it, becoming gradually thinner and less vascular, is at last quite absorbed. The absorptive process goes on in the gum cover-

* Cooper's Surgical Dictionary, p. 211.

ing the tooth, which at last presses through, and is said to have cut the gum.

The period of the first dentition is subject to some variation, but as a general rule we may say that it occupies from the seventh month to twentieth or thirtieth. The teeth commonly appear in each jaw in couples; thus about the seventh month we find the two central incisors of the lower jaw appear; then, after a short time, those of the upper jaw, followed after an interval by the lower lateral incisors, and then by the upper lateral incisors. From the twelfth to the fourteenth month the four first molar teeth appear, and from the sixteenth to the twentieth the lower and upper canine teeth; last of all the four last molars. The succession here stated has been observed by Serres and De la Barre to be the general order in which the teeth become ossified, and Dr. Ashburner's experience agrees with theirs. The lower incisors generally appear first, and Dr. M'Clintock has suggested that in this order there is a beautiful provision for the protection of the mother. The tongue of the child protects the nipple from irritation by the lower teeth when sucking, but it cannot from the upper; if, therefore, the upper teeth appeared first, the nipple would be exposed to injury, from which, for a considerable time at least, it is now guarded. M. Trousseau states the succession thus: 1. The two inferior median incisors. 2. The four superior incisors. 3. The inferior lateral incisors, and the first four molars. 4. The canine, and 5. The last four molars.

But although this sketch may indicate sufficiently well the usual process of teething, it is a rule to which there are many exceptions, a law from which there are many deviations. Children are occasionally born with teeth, or cut them shortly after birth. I knew a child who was found to have three well-developed teeth at birth, and others who cut two and four the first fortnight of their life. Dr. M'Clintock saw one child, at the Hospital, born with the two middle upper incisors cut. Haller has noted nineteen cases of the precocious appearance of the first teeth. Denman mentions a child born with teeth, and Ashburner one of a child who cut the two incisor teeth of the lower jaw before three months old. Louis XIV. of France, Richard III. of England, and Mirabeau, were said to have been born with teeth. Neither do they always appear in pairs. I have a little patient in whom the right lateral incisor of the upper jaw did not make its appearance before three years old, although she possessed all the other incisors, canine teeth, and some of the molars. Occasionally the lateral incisors appear before the central ones, or the canine teeth before the incisors.

On the other hand there is often great delay before the teeth appear. Van Swieten mentions a healthy child that did not cut a tooth until it was nineteen months old; Underwood one at twenty-two months; Dumas one beyond seventeen months; and Serres quotes a case from Lanzoni of a little boy who did not cut his first teeth until he was seven years old. Dr. Ashburner saw "a child twenty-two months old beginning to cut its first tooth, which was an incisor in the upper jaw."

Foucard gives an instance in which, at six years old, the child had but the front teeth, and Rayer one in which the four canine teeth did not appear till thirteen years of age.

Very frequently the order of succession is violated ; the upper incisors may appear before the lower, the molars before the canine teeth, or even before the lateral incisors, and perhaps all the upper teeth taking precedence of the lower. Dr. Hamilton observes: "In some rare cases, the grinders come out before the cutting teeth, and the usual order of succession is changed. It is not uncommon, too, for several pairs to succeed each other rapidly, and then for a considerable period to elapse before the rest advance. In general, the later the commencement of teething the shorter are the intervals between the several pairs."* For further examples of abnormal variations in teething, I must refer the reader to Meckel's Anatomy, and to the special works on the teeth.

Let us now consider the second dentition. "The germs of the second set of teeth," says Dr. Ashburner, in his excellent little essay, "have long existed in the jaws. It has been remarked that the germs of the first dentition are attached, in the fœtus, immediately to the membranous folds which at this period constitute the gums ; and that those of the second dentition are suspended from them by means of small pedicles. When the capsules of the first dentition were advancing towards their development, and were approaching the upper part of the gum, those of the second appeared to retreat into the depths of the jaw, and hung to the gums by their pedicles. The pedicle in the process of growth is destined to perform an important part. It becomes a fibrous canal, communicating between the alveolar margin and the cell in which the capsule is lodged. It is apparently periosteum ; but, whatever may be its real nature, it leads to the tooth, and becomes continuous with the external layer of the dental membrane." "The gums grow, they enlarge ; as their volume increases, the germs of the permanent teeth continue to develop the organs they have to form. These germs are inclosed in cells in the bony substance of the jaws. Up to the age of five, six, or seven years, the jaws of a child may be said to contain two sets of sockets,"† which are kept distinct by a bony lamina. But whilst this process of growth and development of the jaw and second set of teeth is going on, another commences having reference to the first set. The root is gradually absorbed, so that if we remove a *loose* primary incisor, we shall find it more or less deprived of root, according to the time absorption has been going on, and apparently seated on the gum rather than inserted into it. When the absorption is far advanced, the tooth becomes dead and loose, and when completed it falls out or is removed by the child itself. Previous, how-

* Diseases of Infants, p. 73.

† On Dentition, p. 62.

ever, to the decadence of the first incisors, we generally find a molar tooth of the permanent set make its appearance behind the last molar of the first set, the jaw having expanded so as to afford sufficient space. The age at which these first appear is stated differently; by Sœmmering at seven or eight years; by De la Barre at five or six; by Bell at six and a half, and by Ashburner at about six years, although he saw them cut through in one case at three and a half years. The incisors are sometimes shed before the molars appear. This condition, of course, increases the total number of teeth. The first set consists of twenty, and then four permanent molars make the number twenty-four.

Soon after the appearance of these molars (or sometimes before), at the age of five, six, or seven years, I have said that the central incisors loosen and fall out; and, the same process of absorption extending to the roots of the other deciduous teeth, they are likewise shed successively, and, as a rule, pretty much in the order in which they appeared, but with uncertain and considerable intervals between each pair. The temporary incisor and canine teeth are thus replaced by permanent incisor and canine teeth, and the four deciduous molars in each jaw (two on each side) by four bicuspid teeth, making twenty-four, which, with eight more (four molar and four wise teeth), make the full set of thirty-two.

Now let us inquire into the epochs for the appearance of all these teeth. We have seen that the two deciduous central incisors of the lower jaw, belonging to the first set, fall away about the age of seven years. The vacant spaces are soon to be occupied by a couple of incisor teeth, which cut through the gums with edges that are serrated—an appearance that time takes away. When these teeth are half up, the two superior central incisors fall away, and are succeeded by two much larger teeth. In consequence of the want of a perfectly normal instance of healthy growth, it is very difficult in London to fix the time when the next two incisors, the lateral of the lower jaw, should fall out. Irregularities in this respect are very numerous, for the perfect consent between the growth of the teeth and that of the jaws is wanting. The common occurrence is that of a pressure, from deficient growth of the jaw, turning the newly arrived central incisors out of their line for a time, producing an angle at the median instead of a continuous arc: and their backs appear to be pushed towards each other. In most cases, the jaw increases in time, and the teeth assume their proper stations. About a year is occupied in shedding the four central incisors, and another year in that of the four lateral incisors. The anterior bicuspid teeth of the lower, and those of the upper jaw, are next to be shed. These occupy another year. The posterior bicuspids go next, and then comes the turn of the cuspidati or canine teeth; but very often the canine teeth take precedence of the posterior bicuspid. The falling out of the posterior deciduous molars and canine, and replacing by these teeth, is a process that lasts from about nine and a half till twelve. In the meantime, the jaws manifestly enlarge, particularly at the posterior

part. Spaces are found behind the first permanent molars. These teeth appeared at six years of age, and before thirteen and a half four new molars are cut. The individual has now completed the development of twenty-eight teeth, and is nearly ready to encounter the further unfolding of the frame which is implied by the changes attendant on puberty. Three or four years seem to be required for a due perfection in the growth of the organs of reproduction; and during the remainder of this septenary period the system adds secretion to the body, while four new molar teeth are put forth, completing the full number of thirty-two teeth in the mouth. These last four, cut between seventeen and twenty-one years of age, are the wise teeth, or *dentes sapientiæ*. Deviations from the ordinary rule are just as common with the second dentition as with the first, and all we can attempt is an approximative estimate.

From what has been said, it will be perceived that the resistance to the first set of teeth arises first from the fibrous capsule, and secondly from the gum, which is tolerably thick over the teeth, and of a dense texture. Through these structures the tooth must force its way by pressure, and consequent absorption, as it ascends. As the tooth rises, the anterior and posterior walls of the gum appear to separate, and the edge spreads out and becomes broad; the gum swells, its texture is less dense and more vascular, and it rises on either side the central line or ridge until this appears rather as a depression. As absorption proceeds, the gum immediately over the tooth becomes thinner and paler, until we can distinctly trace the edge of the tooth through it. At length the gum is pierced and slightly retracted, and the tooth is said to be cut. Occasionally, I have noticed a drop of straw-colored fluid between the tooth and the surface of the gum, giving it the appearance of a vesicle. The second dentition gives much less trouble, and for obvious reasons. The teeth which supply the place of the first set have little more than the resistance of their own capsules to overcome. The vacancy left by the first is merely healed over, and easily opened by the second, which so soon succeed. The additional molar and wisdom teeth, of course, meet with as much or more resistance than the first set.

If the child be healthy and the process of dentition favorable, the suffering is not so great, and the distress is almost entirely local. For some time before, the gums are much swollen; there is an abundant flow of saliva from the mouth; the child dribbles, as it is called, incessantly, and thrusts its finger, or anything it can seize, into its mouth; and if we put our finger into its mouth, instead of sucking as heretofore, it attempts to relieve the irritation of the gums by biting. Up to this time, the mouth is quite cool. As the teeth advance in the gums, the latter swell and become softer and tender, but with a feeling of tension and itching, which makes the infant anxious to close them upon something, or to press something against them, even though

this be accompanied with some degree of soreness. There are occasional stings of pain, as we know by the sudden cry of the child; and if there be several teeth coming forward, or if the gums appear inflamed, the mouth will feel hot to the finger. The child now bites vigorously; its mother does not escape with impunity, and it carries everything it can seize to its mouth. It is fretful and uneasy, does not sleep as quietly as usual, and the bowels may be rather more free than at other times. The dribbling continues until the tooth is cut through. The irritation may extend to the lining membrane of the nose, or to its nerves, and the child be observed to sneeze frequently and to rub its nose. It would seem that dentition is commonly more severe in the winter than in the summer, and certainly more so in large cities than in the country; and its consequences are more serious in badly nurtured children of delicate constitution, and among the poor.

This, I think, is a pretty accurate description of a case of easy dentition, in which the local distress is not excessive, and there is neither fever nor sympathetic irritation. So long as this is the case, interference is unnecessary; there is no reason for lancing the gums, and the slight diarrhœa is beneficial. Ivory, caoutchouc, or gutta percha rings, for the child to bite, are useful. Davies prefers a flat ivory ring; but, in my opinion, by far the best thing is a finger-shaped crust of bread, or a biscuit, if care be taken that the infant do not break or bite off a piece.

Now let us turn to the case of *severe dentition*, in which we find the local symptoms considerably aggravated. The mouth is hot, and in some cases dry: the gums are of a bright or deep red color, much swollen, and very tender. The child is not now inclined to bite, on account of their tenderness, and in some cases even sucking gives pain. The suffering is very considerable; the child is restless, cross, and uneasy, crying bitterly without any cause, and refusing to be comforted and amused by its usual playthings. Its sleep is disturbed; sometimes it cannot settle to sleep, at others, after sleeping for awhile, it awakes up crying. Its thirst is great, and it takes cold drinks with avidity. The flow of saliva may be nearly arrested, or it may be excessive, and occasionally the submaxillary glands are enlarged and tender. The cheeks are flushed, especially after sleep. If the local inflammation continue to increase, we may find the appearances of muguet on the inside of the lips or cheek, or the gums may ulcerate.

The local treatment is simple enough. The distress results from inflammation of the gums, excited and kept up by the pressure of the teeth, and it will be almost instantly relieved by dividing the gums freely with a gum lancet. There are one or two points, as regards lancing the gums, which I would wish to impress upon my junior readers. First, that, in order to perform the operation effectually, the gum lancet should have a back spring like a knife, and not an open

back like a bistoury ; for it is almost impossible to lay open the gums thoroughly with an instrument that is not firm and steady, and still less with a common lancet, although that has been recommended. Secondly, that a slight scarification of the gums for the relief of teething is of no use whatever ; they must be cut through until we feel the lancet touch the tooth, and to the full extent of the swollen gum and a little further. I have often seen the irritation continue as severe as ever after an incision over the central incisors, because the operator had not noticed that the lateral ones were pressing forward ; and so of the other teeth. Moreover, when the suffering is very great, or in the case of the molars, or with the canine teeth, which commonly make their appearance between the lateral incisors and first molars, it is quite necessary to make a crucial incision down to the tooth, so as to free it completely. And I would beg to impress on the student that, owing to the fright of the mother or nurse, and the cries and resistance of the child, to lance the gums effectually is by no means an easy operation, but one that acquires both firmness and deliberation, to avoid on the one hand, cutting too superficially or too limitedly, and, on the other hand, wounding the mouth or tongue. Lastly, in severe cases the operation will have to be repeated. It is a very good plan when the sympathetic irritations (of which I shall speak presently) do not speedily subside, to run the lancet along the old incisions every three or four days ; it gives no pain, and prevents the wound from closing over.

It is a mistake to suppose that the gum when healed is more resisting to the tooth than if it had not been lanced, unless a very long time have elapsed ; and it is to be presumed that ordinarily no such early lancing will be necessary, but when it is so the gum must of course be reopened. The repetition may be necessary, either because the gum has healed, or because the first operation was ineffectual, or as a precaution if the sympathetic irritation continue. In very severe cases, when the ordinary lancing does not seem to afford adequate relief, we have been advised to shave off the entire edge of the gum over the tooth with a bistoury. I have never found this necessary, but I had a case lately in which I was obliged to use the lancet thirty or forty times, each tooth requiring several operations, and the suffering continuing until all were cut. From this case, and some others like it, I am inclined to believe that there is an irritation of growth as well as that arising from the resistance of the gum, for the latter I took care to remove or prevent. In very rare cases the bleeding from the wound has been excessive, but it may be arrested by pressure, astringents, or caustics.

Besides lancing the gums freely, it is desirable that the bowels should be more free than at ordinary times, and even if they are somewhat purged it will not signify, as this is by far the safest local irritation a child can experience during dentition. If, however, they should

be too much moved, and with griping pain, we may easily quiet them by chalk mixture with aromatic confection, and a drop or two of laudanum to the ounce, according to the age of the child, taking care only to moderate and not to arrest the action of the bowels.

If the gums are disposed to ulcerate it will be well to apply a little borax and honey to them occasionally, or a little acid and water; but in general they are so much relieved by the lancing that they recover their healthy state without any application.

But the suffering occasioned by dentition is not confined to the mouth; if it exceed a certain amount, or in children of an irritable constitution, the irritation is *reflected* by the nervous system to some other organ or system of organs. The sympathetic irritations occur pretty much in the following order.

1. The most common disturbance is *irritation of the bowels*, as I have already mentioned, diarrhœa, with griping pain, and sometimes tenesmus. If it be not excessive it seems rather a relief, and as it is the least injurious of all the irritations resulting from dentition, we should rather moderate than altogether arrest it. The child will certainly become weaker, thinner, and its flesh soft and flabby, but this will rapidly be remedied when the teeth are through. When it is excessive, and the quantity and frequency of the discharge are great, we shall find it necessary to interfere with a mixture of chalk and laudanum, as just recommended, increasing the laudanum if necessary, or adding tincture of kino or catechu. If there be much pain and flatulence, an occasional warm bath and the use of liniment composed of half a drachm of laudanum to two ounces of compound camphor liniment, will be found of great service. If this fail, a mustard and linseed-meal poultice (one-third of the former to two-thirds of the latter), or a blister to the epigastrium for an hour or two, may answer the purpose.

Vomiting does not always coexist with the diarrhœa of dentition, but it does sometimes, and may prove very troublesome, especially because it deprives the patient of food, and renders the administration of remedies difficult, so long as it continues. As a general rule, it is the consequence of irritation, and not of inflammation, and will be relieved by the division of the gums, and the exhibition of half a drop or a drop of laudanum, or counter-irritation to the epigastrium.

M. Cruveilhier has described an affection, apparently caused by dentition, under the title "*Maladie gastro-intestinale des enfans avec des-organization gelatiniforme*," in which thirst, vomiting, and purging, with collapse, are the leading symptoms. This disease, however, is so much more serious than the ordinary vomiting and purging of dentition, as to deserve a distinct notice; and the same may be said of the disorder noticed by M. Guersent.

In all these affections of the digestive tube, warm baths, emollient fomentations, poultices, and slight counter-irritants to the abdomen, are exceedingly useful; but we must also regulate the diet carefully. If

possible, the child should have its natural food, and but little besides, if it agree with him ; but if he be already weaned, the diet should be of the simplest kind—boiled milk or milk and water, rice milk, thin arrow-root made with milk, bread jelly, &c.

2. Next to the stomach and intestinal canal, and often coincident, the most frequent seat of irritation is *the skin*. Patches of papular eruption appear on different parts of the body, particularly the face, and disappear after a time ; or the child may be attacked by some more permanent eruption, such as crusta lactea, prurigo, eczema, &c., especially of the scalp, which, while it affords relief for the time, becomes itself a very troublesome disease, requiring special treatment, and which, unlike many other irritations is not necessarily cured by the liberation of the teeth. If any disease of the skin should exist previous to dentition, it will be found much more difficult, if not impossible, to cure it, until that process is completed. Even when apparently cured, the irritation of teething will cause the eruption to reappear. The relief of the gums is then an essential part of the treatment of the cutaneous affection. We often find that during dentition the parts behind the ears become soft, tender, and inflamed, with a discharge which keeps these parts excoriated and sore. Among the poor this is regarded as a matter of course, and little or no efforts are made to cure it until after the teeth are through ; but if we relieve the gums, the ears may be also restored to their natural condition by a little black wash and gentle purgatives. As it is a natural derivation, it might be unwise to stop it unless other means were adopted for the relief of the original irritation.

3. Probably the next sympathetic irritation, in point of frequency, is some affection of the *nervous system*. This may develop itself in different localities, and with different degrees of intensity. I saw the other day a single attack of spasm of the glottis, resulting from teething, and relieved by lancing the gums. Or the spasm may return frequently in the course of the day, and continue for weeks, alternating with convulsions. Lancing the gums is absolutely necessary, and generally relieves the child, but as the attack is apt to return with each tooth, further measures must be adopted. The bowels should be kept rather more free than usual, warm baths given occasionally, the gums freely divided at the first sign of dental irritation, and if necessary, a blister applied behind the ear, or to the back of the neck ; or if more permanent counter-irritation be desired, a seton of three threads of silk inserted into the arm. Fresh air is very desirable, and if possible, a change of air from the town to the country. For further details I must refer my readers to the chapter on spasm of the glottis.

But, instead of spasm of the glottis, the child may have a fit of convulsions, partial or general, limited to the muscles of the face or one extremity, or involving the whole body. The symptoms and treatment

have already been described ; the most important point to remember is, that although dentition may be the sole cause, lancing the gums, warm bath, and purgatives may not be all that is necessary for the cure, but we may be obliged to have recourse to bloodletting or leeching, with subsequent counter-irritation.

Lastly, the distress of teething may give rise to paralysis of an arm or a leg, or both together, or of the muscles of one side of the face. It may occur with the first dentition ; but as Dr. Fliess has observed, it is more common during the second. It is remarkable for the suddenness of its attacks ; the child may appear quite well the previous day, but during the night it is uneasy and restless, grinds its teeth and screams or groans. There may be some thirst, a degree of heat about the head, and feverishness. The next morning it is found to have lost the power of an arm or leg, or in rare cases of both : the limb is warm but hangs powerless, and from the gravitation of the blood is of a darker color than the other. Sensibility is either much diminished or altogether lost : the child rarely complains of pain, but sometimes of a sense of dragging from the shoulder. When one side of the face is affected, the distortion will attract immediate attention, the mouth is drawn to one side whenever the child attempts to speak or is excited, and the greater the excitement, the more marked the distortion. When perfectly quiet, the face in most cases appears quite natural. The attack does not often prove fatal ; if the teeth be cut through naturally or liberated by the lancet, the paralysis may gradually wear off, and the child recover the use of the limb or face ; or the paralysis may become chronic, without any very obvious disease of the nervous system, the limb remaining powerless or nearly so, and gradually becoming atrophied, or the distortion of the face continuing during life. Or, when the paralysis resists all treatment, we find symptoms gradually developed which indicate disease of the spinal cord and brain. The child is attacked with dyspnœa, palpitations, twitching of the eyes, squinting, and at length becomes comatose and dies. We have seldom an opportunity of ascertaining the state of the spinal marrow by a *post-mortem* examination, but in one case of the kind, who was killed suddenly, Dr. Fliess found a remarkable degree of vascularity about the roots of the brachial nerves, the membranes were reddened and the whole circumference seemed congested,* but there was no real organic change. It is clear, therefore, that this is a disease of reflex irritation. The proper treatment consists in relieving the irritation of the gums, in the first instance by a very free scarification, and if necessary by the removal of the primary teeth, then by cupping or leeches to lessen the vascular congestion about the roots of the nerves. The limb may be

* Journal für Kinderkrankheiten, June and July, 1849. London Jour. of Med., Jan. 1850.

wrapped in flannel, and mild purgatives given. The application of stimulants or electricity to the affected limb is of no benefit at first; when the disease has become chronic they may be worth trying.

4. Affections of the *chest*, bronchitis, pneumonia, &c., are often attributed to the irritation of teething; and without calling in question the possibility, I am inclined to think that in many of these cases it is merely a coincidence. The child takes cold when teething, and as undoubtedly it will be difficult to cure the pulmonary affection until the gums are relieved; the two are connected as cause and effect. In addition to the proper remedies for the disease, we should always lay open the gums, whenever we have reason to suspect the slightest irritation from the teeth.

Many other diseases are enumerated as resulting from dentition, but those I have named are the principal ones. The list has, no doubt, been lengthened by including coincident affections arising from other causes, just as the mortality attributed to dentition embraces many cases in which death resulted from the secondary or synchronous disorder. At the same time I differ from those who go to the opposite extreme, and deny all secondary diseases, and nearly all fatality arising from dentition.

Formerly it was extremely difficult to comprehend the mode in which the secondary affections occur; but since Dr. Marshall Hall's brilliant discovery of the reflex action of the nerves, we understand so far that the irritation of the gums, conveyed to the nervous centres, is thence reflected, or rather projected to some other organ; but of the laws which determine the particular organ or system thus affected we know as yet but little.

In conclusion, I would beg my junior readers to bear in mind that many diseases which prove obstinate in infancy and childhood, but which originated quite independent of dentition, may owe their persistence to an access of teething arising during their course, and that we shall fail in curing them unless we first relieve the gums. In fact, the diseases which are easily cured at other times, become excessively obstinate during dentition, and it will be well always to ascertain the state of the teeth whenever we find such diseases do not yield to our treatment. This applies equally to most of the diseases of infancy, and especially to diseases of the skin, during both the first and second dentition. With the exception of diseases of the skin and the bowels, the second dentition rarely excites any sympathetic affection, nor is the local irritation great. The posterior molars and the wisdom teeth give a good deal of pain, which may be relieved by a touch with the lancet.

CHAPTER III.

INFLAMMATION OF THE MOUTH.—ERYTHEMATOUS STOMATITIS.

INFLAMMATION of the mouth is sufficiently common among children of all ages, from birth to ten or twelve years old, and we find it varying in extent and intensity, constituting the simple or erythematous stomatitis, muguet or pseudo-membranous stomatitis, aphthæ or ulcerated stomatitis, and gangrene or cancrum oris, described by authors.

In *simple or erythematous stomatitis*, the mucous membrane is observed to be unusually red, either generally, in points, or in patches. The entire surface of the mouth may be involved, or only the mucous membrane lining the cheek, or merely the gums, and in the latter case we find them spongy, with their edges rounded, swollen, and somewhat loosened from the teeth. The mucous membrane thus affected, is, as I have said, of a deeper or brighter color than usual, puffy, and extremely tender to the touch. The mouth is very hot, and, except at the beginning, there is a profuse secretion of a colorless bland saliva. The child is extremely uneasy, restless, and fretful, and, when sucking or eating, is evidently in great pain. In addition to these local symptoms, in many cases we shall find the bowels disordered, with flatulence and griping. Very little fever accompanies this affection, except in those cases where the child is, in addition, suffering from dentition.

Causes.—The causes to which the disease may generally be attributed are either a disordered condition of the intestinal canal, or dentition. Both give rise to irritation at the commencement of the digestive tube; and in the latter case, if the patient have already teeth in one jaw, their pressure upon the opposite gum, already swollen by the teeth approaching the surface, very frequently converts irritation into positive inflammation and slight ulceration, which may spread to the neighbouring parts. Any irritating matters taken into the mouth may give rise to stomatitis, and it not unfrequently occurs in the course of certain eruptive fevers, as measles and scarlatina.

Treatment.—In its simple form, the disease involves no danger, and is easy of cure. The bowels should be freed by a brisk purgative, if they be at all confined; but if there be irritation and diarrhœa, we shall do better to quiet that before clearing the intestinal canal. If the child be teething, the gums must be freely lanced, and, these sources of irritation being removed, very simple local treatment will be sufficient. Cool emollient drinks, which the child will eagerly take, are the best application in the acute stage; and when this is past, we may gently apply a little honey, then a little borax and honey, in such proportions as the patient can bear. If this fail, we may try a mix-

ture of honey, alum, and water, in the proportion of one part of alum to fifteen of honey, and seven of water, as recommended by M. Bouchut. But the great point is to restore the stomach and bowels to their healthy condition.

Generally speaking, the attack subsides easily, but if neglected or badly treated, or if more than usually severe, it may give rise to muguet, aphthæ, or ulceration.

CHAPTER IV.

MUGUET. PSEUDO-MEMBRANOUS STOMATITIS.

THIS common affection of infancy and childhood has long been known to practitioners under various names, as *aphtha lactantium*, *aphtha lactamen*, *aphtha infantilis*, although its true nature and seat is a modern discovery, due chiefly to the labors of Guersent,* Lelut,† Billard,‡ Valleix,§ &c.

By many it has been and is still confounded with the vesicular aphthæ, or thrush, though no two diseases can be more distinct, muguet being an abnormal secretion or growth *upon* the mucous membrane of the mouth, and thrush consisting of a vesicle or pustule formed beneath the epithelium.

Muguet may be either idiopathic or symptomatic, either a primary or a secondary affection.

Symptoms.—After inflammation of the mouth has continued for a longer or shorter time without yielding to treatment, or without our being aware of any previous inflammation, we may observe in different parts of the mouth small points or patches of a curdy-looking matter, at first, if the child be sucking, probably mistaken for the remains of milk. This matter, however, is adherent to the subjacent membrane, although by a little trouble it may be removed. These points or patches sometimes disappear in a few hours, if the attack be very slight; but if severe they increase and coalesce, so as to cover more or less of the mouth and fauces, as by a false membrane; or, after disappearing

* Dict. de Méd., art. Muguet, Stomatite.

† Arch. Gén. de Méd., vol. xiii. p. 335, 1827.

‡ Traité des Mal. des Enfants, p. 199.

§ Clinique des Mal. des Enfants Nouv.-nés, p. 202.

for a short time, they may return and increase. This pellicle is of a white color when unstained; but it is occasionally tinged yellow or reddish, as Billard has observed, by bile, or blood exuding from the mucous membrane, and this particularly in severe and fatal cases. It may occur at any period of infantile life (or at a later period), but it is more frequent during the first year, as the result of derangement of the stomach and bowels; but when children of this age are crowded together, badly tended, and insufficiently nourished, then the disease displays itself in its severest form. If the mouth be carefully examined before it is entirely covered by the white pellicle, the intervening mucous membrane will generally be found more vascular than natural, dryer, of a brighter or deeper red color; and if we detach a portion of the pellicle, the surface underneath will be seen to be highly inflamed.

In addition to the local condition of the mouth, there are few constitutional symptoms; the child is uneasy, and may find it difficult or painful to suck; and, although very thirsty, the effort of drinking occasionally gives great pain, nay, in some cases, I have seen it impossible. This, perhaps, may be owing to the extension of the disease to the œsophagus, of which I shall speak presently. The skin is hot and dry, although the pulse does not seem to be much quickened. M. Billard "counted the pulse and beatings of the heart in forty children, aged from one to twenty days, affected with it, and found fifty, sixty, sixty-four, eighty, and, in one instance, 100 pulsations in the minute." The conclusions to which M. Bouchut has arrived are: "That there are two varieties of muguet, idiopathic and symptomatic; that both depend upon the general condition of the individual; the first upon a bad state of the constitution, and the second upon deranged health from organic disease; that the only proper symptoms are the local ones, *i. e.*, the condition of the mouth; that the general symptoms depend upon the disease in the course of which muguet occurs; that ordinarily they are those of enteritis, but that they may be those of pneumonia, tubercular phthisis, hydrocephalus, &c." The local phenomena, then, which characterize the disease, are precisely the same, whether the latter be primary or secondary, but the general symptoms are often much more severe than I have described, especially when the disease is epidemic, in hospitals, or when it occurs as a secondary affection, as will appear presently.

Pathology.—Careful and repeated investigation has established beyond dispute essential difference between muguet and aphthæ. Muguet is not seated beneath the mucous membrane generally, nor does it involve the destruction or disorganization of that tissue. It is a curdy matter deposited upon the surface, quite removable, and which, in fact, is constantly thrown off, leaving an unbroken surface beneath.

What then is the matter, and how does it originate? Opinions differ upon this point. M. Auvity and others have regarded muguet as a disease of the mucous follicles, but the minute researches of M. Lelut

seem to have refuted this opinion, inasmuch as he never could detect any prolongation of the false membrane into these follicles, but found it perforated at their orifices; and this observation upon the living was abundantly confirmed by careful examination after death. He describes two varieties of muguet: one, creamy, in patches, of a creamy consistence, easily removed by lotions or slight friction, and which is seated upon the mucous membrane; the other in flocculi, irregularly filamentous, yellow and either under the epithelium or at least so adherent to the mucous membrane that the latter may be removed with the deposit. Further, he concludes that this false membrane is analogous to other false membranes which are found internally or externally to the secretions of the mucous membranes, and to the epithelium itself; and this conclusion was attained by submitting each to the same chemical tests, with the same results. M. Lelut's researches would seem to prove that on the edges and inside of the lips and cheeks, and on the central portion of the palatine vault, the false membrane is beneath the epithelium; but that on the other parts of the mouth and in the œsophagus it is either upon the epithelium, or, if originally beneath it, it rapidly so transformed it as to render it undistinguishable.*

M. Billard regards the deposition as coagulated mucus, and Guyot as mucus modified by excess of fibrin. M. Bouchut rejects the opinion of Lelut that muguet is analogous to other false membranes secreted by the mucous membrane, and considers that it is a vegetable parasite, formed according to the laws of spontaneous generation; and he gives the following extract from the report of the Académie des Sciences, the exactness of which he states he has many times proved: "A portion of muguet being placed under the microscope, it is seen to be composed of a mass of cryptogamic plants. It consists of conical elevations of twenty-five *millimetres* in diameter, each one consisting of separate portions, provided with roots, branches, and sporules. The roots are implanted in the cells of the epithelium; they are cylindrical and transparent, of 1.400 of a millimetre in diameter; and in their development they perforate each series of cells composing the epithelium to arrive at the surface of the mucous membrane. The trunks or stems which grow from the surface of the epithelium are equally transparent, interrupted at distances by divisions, and inclosing in their cavities corpuscles. Like the roots, they are cylindrical and rectilinear, 1.4 of a millimetre in length, and 1.400 of a millimetre in thickness. These stems are divided into branches, which again subdivide, bifurcating at a very acute angle. The branches are composed of oblong distinct cells, inclosing in their interior one, two, or three transparent knots (*noyaux*), their sides here and there exhibit sporules, of which there is a great number at their extremity. The diameter of these sporules is from 1.200 to 1.400 of a millimetre. These cryptogamia have con-

* Archives Gén. de Méd., vol. xiii. p. 360.

siderable analogy with the *mycodermia* of the *porrigo favosa*, and resemble the genus *sporotrichium* of botanists.* M. Bouchut agrees with M. Lelut as to the red and dry condition of the mucous membrane underneath the muguet, but differs from him in regarding the muguet as a growth *upon* the epithelium everywhere. He describes the mode of extension from the mouth to the pharynx, œsophagus, and stomach; and he mentions distinctly having seen the disease in the large intestine and around the anus, thus confirming the observations of Ledi-berder, Billard, and Valleix.

Dr. West observes: "I cannot pretend to decide, from personal observation, the point at issue between the supporters of these two conflicting theories, but my opinion decidedly leans to the adoption, as generally correct, of that view which sees in the deposit of aphthæ and muguet the result of an inflammatory process ending in the formation of false membrane, wherein a parasitic growth may become developed. The frequency of the parasitic growth in the false membrane is possibly dependent on the actual transplantation of its sporules from one patient to another, by means of the cups, spoons, &c. used by them in common, and generally without sufficient attention being paid to insure their perfect cleanliness. Whether, in any case, the deposit of these sporules upon the surface of the healthy mucous membrane is followed by the development of the confervæ and the alteration of the epithelium of the mouth, is a question to which it is not possible at present to give a satisfactory reply. For my own part, I should greatly hesitate to answer it in the negative."†

Dr. Berg, of Stockholm, in a valuable work upon the thrush in children, but which appears to me to be rather a description of muguet, regards it as a parasitic disease, and has given at great length its microscopic characters. "The white coating," he says, "consists of epithelium thickened by the swelling of its constituent cells, and from this epithelium there springs a parasitic fungus of greater or less quantity, so that the chief portion of a patch of aphthæ is composed either of epithelium or else of parasitic growth. Now, the relative proportions of these two substances seem to depend upon the length of time that has elapsed since the growth of the parasite commenced, which varies in different children, and it is also in relation to the diversity of the epithelial thickening. More or less of molecular albuminous matter is also to be found in these patches. When the parasitic growth and the epithelial condensation is confined merely to the extremities of the smaller papillæ (as at the point of the tongue), they have the appearance of small isolated specks, but when they appear upon portions of the mucous membrane where the papillæ are less prominent, and where the intervals between them are filled by a denser epithe-

* Manuel Prat. des Mal. des Nouv.-nés, p. 174.

† Diseases of Children, p. 337.

lium, the white coating then assumes those forms of circles, of interlacing bands, or of hemispherical elevations, so frequently observed in parasitic vegetations, when they are permitted to increase freely without any mechanical obstacle to their growth. Lastly, when both the epithelial and parasitic growths alike proceed vigorously, those spots which at first were isolated, coalesce more and more into a continuous covering, the cohesion of which is maintained not merely by the natural adhesion of the epithelial cells, but also by the interlacing of the parasitic fibres among themselves and between the cells of the epithelium.* Further, Dr. Berg concludes that, "1. The aphthous parasite can propagate itself in appropriate menstrua out of the body, and this not only when the aphthous crust is mingled with various animal fluids, but also when completely separated and cleansed from these. 2. Its growth in such cases proceeds not only in a temperature not equal to that of the human body, but likewise in one that is much lower. 3. Aphthæ seem to require for their growth the presence of a body containing azote, such as albumen, as also that of materials for the generation of acid. 4. Out of the body, aphthæ seem to develop themselves in two different forms, either in that of a great preponderance of sporules—when a white filmy membrane forms on the surface of the fluid—or, again, they appear chiefly as stems ramifying through the fluid or aggregated into a felt-like mass. A solution of potassa will always dissolve the molecular deposit of albumen, leaving the fibres and cells of the parasite totally unchanged.

It is very pleasant to recollect that we may recognize and cure the disease, may in fact understand all about it practically, and control it, notwithstanding these microscopic difficulties and doubts. The important facts we know are, that, as the result of an inflammation of the mucous membrane of the mouth or digestive tube, a deposition of curdy-looking matter may take place in the mouth, or in other parts of the digestive canal, and that generally this matter is upon the epithelium, and does not involve the destruction of the subjacent membrane.

Causes.—I have already alluded to the greater prevalence of this disease in the early months of life, at a period when the constitution is peculiarly tender, the digestive tube scarcely reconciled to its new functions, and when mismanagement is so immediately and seriously injurious. Even under careful treatment we meet with it, but much more frequently when the infant is exposed to bad food, impure air, or insufficient clothing. I quite agree with the opinion of MM. Baron and Billard that the disease is not contagious in the ordinary sense; but that it may be communicated by contact under circumstances, *e. g.* to the nipples of the nurse, I have no doubt, because I have seen it, and this agrees with the experience of MM. Guersent and Marlay. Dr. Berg considers the parasitic growth to be favored by the large

* British and Foreign Med Review, vol. xxiv. p. 423.

proportion of sugar and starch in the food of children, and he believes that the disease may be conveyed from one child to another by sporules or fragments of sporules in the dried state, floating in the atmosphere, but that it is more frequently propagated by the bottles from which children having the thrush have been fed, or by the nipple, especially when two children are suckled by one nurse. He succeeded in propagating it also by applying aphthous crusts to the mucous membrane of the mouths of healthy children.

It may also prevail either epidemically or endemically. In places where many infants are congregated, I may say it prevails at all times. According to Billard it prevails with almost equal intensity and at all times at the Hospice des Enfants Trouvés. In the quarter ending in March, 1826, out of 290 patients, there were thirty-four cases of it. In the quarter ending in June, out of 235 patients there were thirty-five. In the quarter ending in September, out of 213 there were 101 cases; and forty-eight in the quarter ending in December, among 189 patients. M. Baron has seen it prevail among a number of individuals at certain periods, without being able to assign for its cause any influence from temperature.

But no doubt the most frequent cause is to be found in the primary affections to which muguet is secondary, and we shall now inquire into these complications, and for this purpose I shall avail myself of the minute researches of M. Valleix. I am tempted, however, as a prelude, to give a short summary of his experience of the disease in twenty-four cases in the Infirmary of the Hospice des Enfants Trouvés. All the infants were less than a month old, and were strong and vigorous. Most of them had been sent to the infirmary on account of pemphigus or pustules. In one only did muguet exist at that time, and there were no grounds for suspecting its communication to the others by contagion; the less so, indeed, as one-fourth of the infants sent to the infirmary are so attacked. The appearance of the false membrane was preceded some days by an attack of erythema of the thighs. After the erythema had continued for four or five days, diarrhoea supervened, at first moderate, but increasing rapidly, the evacuations being yellow at the beginning. At the same time the pulse was accelerated from 80 or 90 to 116, 130, or even 140; the face became pale and of a dull yellow color. To these symptoms were added most frequently (in nineteen out of twenty cases) a marked swelling of the papillæ at the extremity of the tongue, and shortly after, a vivid redness of that organ which soon spread to the rest of the mouth. In eight cases ulceration of the palate occurred about the same time. The redness and swelling of the tongue indicated the invasion of muguet, the grains of which in twenty cases appeared on the first day. In seven cases they were developed at the same time on the inside of the cheeks, but commonly the tongue was the part first affected. At first a few grains were observed on the tongue, then irregular masses on the inside of the cheeks, and strips on the vault of the palate, and coales-

cings they formed a layer more or less thick. This morbid production was always white at first, and only became yellow towards the termination in five cases. It was at first adherent, and any attempt to detach it made the mucous membrane bleed, but afterwards it could easily be removed. During the development of the false membrane the former symptoms (erythema and diarrhœa) persisted, and new ones were added. The stools almost always became green, but in no case could any portion of false membrane be detected in them. The heat of the mouth was rarely increased, but the tongue was dry in thirteen cases. When the muguet was very abundant it occasioned considerable distress, which the infant evidenced by rolling about the tongue and moving the jaws, as though to remove some unpleasant substance. At the same time it refused the breast, and cried if the fingers were introduced into the mouth. Meteorism of the abdomen supervened in twenty cases: in four, previous to the appearance of the muguet; in the remainder, during the greatest intensity of the disease; and was attended by symptoms of colic, and in some cases by tenderness. Vomiting occurred in only five cases, and the matter ejected was sometimes yellow, sometimes colorless. After the diarrhœa had continued for some time, ulceration of the ankles or heels took place, the patient became agitated, intermittingly at first, but afterwards constantly, and the pulse became rapid. The heat of skin was in proportion to the quickness of pulse. Towards the end of the disease, all the symptoms seemed to diminish, but it was only to give place to collapse. The erythema became less vivid; the ulcerations were covered with crusts; the diarrhœa diminished or ceased entirely; the infant refused the breast, and would scarcely drink; the muguet diminished, and ordinarily consisted only of a few grains on the tongue. The pulse fell to 80, 70, or even 60 in a minute; the heat was succeeded by chilliness, at first of the extremities, and afterwards of the whole body; the agitation gave place to almost complete insensibility; the cries were changed into groans; the emaciation and palor became extreme, and the face acquired the appearance of decrepitude. About this period were developed in certain cases, inflammations, not very acute, characterized by œdematous swelling, obscure redness and pain; they occurred in the nose, lower lip, and neck. At this time also abscesses, occasionally numerous, were formed in different parts of the subcutaneous cellular tissue, and in one case gangrene of the integuments of the limb occurred. At last death closed the scene without pain."* The mean duration of the disease was $17\frac{1}{2}$ days in the fatal cases, and $16\frac{1}{2}$ in those who recovered. Three distinct periods were remarked. The first, from the commencement to the appearance of the muguet; the second, from this time to the termination of the febrile stage; and the third the period of collapse. Autopsy revealed

* Clinique des Mal. des Enfants, &c. pp. 209, 210.

various lesions. In nineteen cases false membrane was found in the mouth; in ten the palate was ulcerated. The œsophagus was almost always occupied by false membrane, and in all the cases there were lesions of the gastro-intestinal mucous membrane, the result of inflammation. In a small number ulcerations were found. The liver, the spleen, the kidney, the bladder, the larynx, trachea, and bronchi, presented nothing abnormal, but in eight cases there was hepatization of the lungs. The circulating system was unchanged, except in one case. The skin and cellular tissue exhibited evidences of the lesions with which they had been affected.

I shall add M. Valleix's *resumé* of the special condition of the gastro-intestinal canal in twenty-two cases, merely premising, that, as far as the stomach was concerned, the localities of these morbid changes were as follows:—

At the larger extremity, in	13 cases.
On the anterior parietes, in	12 "
On the posterior parietes, in	11 "
At the greater curvature, in	11 "
At the smaller curvature in	8 "

I. As to the lining membranes of the *stomach*, there was found—

1. *Softening* of the mucous membrane, with thickening and redness, or some other alteration in color, in 6 cases, *i. e.*:

Occupying almost the entire stomach with redness, in	3 cases.	} 6
Occupying a limited portion of the surface, with redness in	2 "	
Occupying a limited portion, with brown discoloration, and softening of the other coats of the stomach, in	1 case.	} 5
2. Softening, with redness, without thickening, occupying the entire extent of the stomach, in 3 cases.

Occupying a limited portion, in	2 "	} 3
---	-----	-----
3. Softening, with neither redness nor thickening, occupying the entire extent of the stomach, in 2 "
- Occupying a limited portion, in 1 case.

4. Alterations of color without thickening or softening, <i>i.e.</i> , <table style="margin-left: 20px;"> <tr> <td>General rose color, in</td><td>5 cases.</td><td rowspan="4">} 7</td></tr> <tr> <td>General brown color, in</td><td>1 case.</td></tr> <tr> <td>Deep red color, punctated, in</td><td>1 "</td></tr> <tr> <td>No change in</td><td>1</td></tr> <tr> <td>No data in</td><td>1</td><td></td></tr> </table>	General rose color, in	5 cases.	} 7	General brown color, in	1 case.	Deep red color, punctated, in	1 "	No change in	1	No data in	1	
General rose color, in	5 cases.	} 7										
General brown color, in	1 case.											
Deep red color, punctated, in	1 "											
No change in	1											
No data in	1											

II. As to the mucous membrane of the *small intestines*, there existed:

1. Extreme softening, with thickening and redness, in 3 cases.
2. Considerable softening, with thickening and redness in 5 "
- Considerable softening, with thickening, but without redness, in 3 "
- Considerable softening, with redness, but without thickening, in 1 case.
- Considerable softening, with neither redness nor thickening, in 2 cases

- | | |
|---|----------|
| 3. Slight softening, with thickening, but without redness, in | 1 case. |
| Slight softening, with redness, but without thickening, in | 1 „ |
| Slight softening, with neither redness nor thickening, in | 4 cases. |
| 4. The natural color and consistence, in | 2 „ |

III. The condition of the mucous membrane of the *large intestine* is thus stated :—

- | | |
|---|----------|
| 1. Extreme softening, with thickening, and of a punctated brown color, in | 1 case. |
| Extreme softening, without thickening, and of a bright red color in | 1 „ |
| 2. Considerable softening, with thickening and redness, in | 2 cases. |
| Considerable softening, with thickening, but without redness, in | 4 „ |
| Considerable softening, with redness, but without thickening, in | 2 „ |
| Considerable softening, with neither redness nor thickening, in | 2 „ |
| 3. Slight softening, with thickening, but without redness, in | 1 case. |
| Slight softening, with redness, but without thickening, in | 2 cases. |
| Slight softening, with neither redness nor thickening, in | 3 „ |
| 4. The natural color, consistence, and thickness, in | 3 „* |

It does not appear that M. Valleix was able to trace the false membrane further than the stomach in more than one or two cases; Veron, Davies, Eberle, and Condie have not been able to trace it beyond the œsophagus, whilst Guyot and Billard have found it through the entire alimentary canal. I have seen a similar false membrane around the anus at the same time that it appeared in the mouth; and though I have not traced it through the alimentary canal, I feel scarcely a doubt that it occasionally extends throughout.

It would appear from these researches that muguet is chiefly secondary to a diseased condition of the mucous membrane of the digestive tube, and that softening of the mucous membrane is the principle form of this disease. We have seen that children attacked by muguet may also suffer from pneumonia, as a complication, and occasionally they are attacked by bronchitis.

Diagnosis.—There is no difficulty in the diagnosis when once the false membrane is formed, inasmuch as the only disease with which it can easily be confounded is aphthæ, and from this it is distinguished by the integrity of the mucous membrane underneath the creamy deposition, and by the fact that the latter is seated upon the membrane generally; whereas, in aphthæ, we shall have small grayish ulcers or pustules in the mucous membrane.

Previous to the appearance of the muguet, the disease of the mucous membrane resembles some forms of gastro-enterite; nor is it of consequence to make a very nice distinction, if it were possible, for in most cases the muguet is secondary to such an affection.

* Clinique des Mal. des Enfants, &c. p. 267.

Prognosis.—Idiopathic muguet, in tolerably healthy children, and uncomplicated with organic disease, is of short duration, and of comparatively little consequence. After a few days, the false membrane becomes thinner, and less continuous, resembling in appearance the patches or points by which it commenced; by degrees it peels off, leaving the mucous membrane moist, and somewhat smoother and redder than natural; and the little patient, relieved from the soreness and distress in swallowing, appears quite recovered. In this simple form of the disease we do not meet with fatal cases.

But it is not so when muguet occurs in dilapidated constitutions, or with extensive disorder of the alimentary canal, or in the course of chronic diseases; the mortality is then considerable, resulting, however, not so much from the muguet as from the primary disease, or from the complications. The affection of the mouth is important, as indicating the state of the constitution; but it is to the primary affection that our attention should be directed. M. Baron had 109 fatal cases out of 140; M. Valleix twenty-two out of twenty-four, all of which laboured under entero-colitis; and in addition, eight of them had pneumonia and one meningitis. M. Bouchut observed forty-two cases in the Hôpital Necker, fourteen of which were idiopathic, and of these none died. In the remaining twenty-eight, the muguet was symptomatic of visceral disease, and of these twenty died: fourteen of chronic entero-colitis, complicated in five cases with pneumonia, four of acute entero-colitis, three of pneumonia, and one of hydrocephalus. The remaining eight were affected with entero-colitis or phthisis, and left the hospital suffering from muguet.

Treatment.—The two forms of muguet are so far different that the one is a local affection, dependent, no doubt, to a limited extent, upon the general condition of the child, whilst the other is secondary to some pre-existing disease—an additional symptom, in short, and little more—and of course the treatment will vary accordingly.

In primary or idiopathic muguet, if the disease be slight, some mucilaginous wash, slightly acidulated, and applied with a brush; or a little honey placed on the tongue, with a gentle purgative now and then, a warm bath, pure air, and wholesome nourishment, will be all that is necessary. If the child have been too early deprived of its natural food, if the suck appear to disagree with it, it will be quite necessary to provide a healthy nurse for it. In some cases, we must add to the wash or to the honey either chloride of soda (one-fourth part), as Guersent and Darling recommend, or a small portion of alum, as Billard advises, or a little borax. M. Trousseau, at the Hôpital Necker, uses equal parts of borax and honey with great success. I have found this extremely useful, but I prefer commencing with a smaller proportion of borax.

Dr. Hecker recommends a solution of the sulphate of zinc, M. Dugès a lotion containing the vegetable acids, and M. Bretonneau the application of a powder consisting of half a grain of calomel triturated

with a few grains of sugar, three or four times a-day. Dr. Condie prefers borax rubbed up with white sugar.

Alkaline remedies are favorites with Dr. Berg, as he found them arrest the formation of the parasite, and at the same time soften the epithelium and aid in throwing off the crusts; but after this treatment has been employed for some time, he advises a change to acid and astringent applications.

In some obstinate and severe instances, it may be necessary to apply stronger remedies, such as nitrate of silver in solution (gr. x. or gr. xx. to ʒj), or muriatic acid and water or honey (ʒj of the former to ʒj of the latter).

In all these cases, it will be advisable to give small doses of the hyd. c. creta, with rhubarb, two or three times a-day, so as to act gently upon the bowels, unless diarrhoea should be present, in which case chalk mixture, or mucilage and water, with a drop or two of laudanum to the ounce, and a few grains of aromatic confection, will form a useful mixture, of which a teaspoonful may be given three or four times a-day. When the looseness of the bowels is corrected, we may then commence with the mercury and chalk. In the cases where the constitution of the child is much deteriorated, I have found great benefit from small doses of quinine, say one-third of a grain three times a-day; and it may be combined with the powders already mentioned, or given separately.

The diet must be carefully superintended. In many cases, the infant cannot suck; it must, therefore, be fed with a spoon. Milk, alone or with water, arrowroot, gruel, with a little wine whey occasionally, will be their best food. Older children will require that their food should be nourishing and soft, so as not to irritate the inflamed mucous membrane.

As the false membrane is only an accidental accompaniment in secondary muguet, our first care must be directed to the primary disease, and the local affection of the mouth will follow its course, diminishing or increasing according to its state. The local remedies just named may be used, but success with the mouth will mainly depend on our curing the primary complaint. Of that I shall speak hereafter.

CHAPTER V.

APHTHÆ. THRUSH. FOLLICULAR STOMATITIS.

APHTHÆ, or thrush, is a very common disease of infancy and childhood, and has been noticed by most writers from very early times; for instance, it is mentioned by Hippocrates, Galen, Aretæus, and Celsus, and in our own country by Harris,* Moss,† Rosenstein,‡ and since then by all writers on diseases of children. The earlier descriptions, however, are so far inaccurate that they confounded muguet with aphthæ, and simple thrush with ulceration, or even gangrene of the mouth.

Like muguet, aphthæ of the mouth may occur at any period of infantile life from birth, or it may attack adults, but certainly it is more frequent in children under four or five years of age; and this we should expect, because it appears to be dependent upon some derangement of the digestive system, and the stomach and bowels are more apt to be disturbed in early life than subsequently. Denis§ and Billard|| regard muguet as more common with young infants, and aphthæ about the period of the first dentition.

Symptoms.—The symptoms will naturally vary according to the extent of the disease, which may be confined to the mouth, and exhibit either few and distinct or numerous and confluent aphthæ, and also according as the affection is primary or secondary. Take, for example, the case of a child in pretty good general health, whose mouth has been thus affected. We shall find a few vesicles or small ulcers, if the tops have been rubbed off; and the mother is sure to direct our attention to the prominent fact that the infant does not like to be fed, that it cries and resists suckling still more, or, perhaps, that it positively refuses to suck at all. This is not to be wondered at, for nothing could be better calculated to give the child pain, except, perhaps, the scouring the nurses give the mouth by way of cure.

The mouth is extremely hot, the lips often swollen, and the saliva constantly dribbling, partly from its excessive secretion and partly from the difficulty of swallowing. The breath is often very disagree-

* De Morbis Infantum, p. 81.

† On the Management and Nursing of Children, &c. p. 185.

‡ On the Diseases of Children, p. 27.

§ Recherches des Mal. des Nouv.-nés, p. 109.

|| Traité des Mal. des Enfants, p. 213.

able, and the bowels will generally be found to be out of order. In the milder cases, however, there is no fever or constitutional disturbance. But when the aphthæ are numerous and confluent; when they extend into the œsophagus, and when as generally happens in such cases, the primary disease is severe, and has broken down the health of the child, then the case presents another aspect altogether. The appearance of the patient changes; he becomes pale and anxious, with a restless, fretful and distressed expression, irritable and whining, unable to suck or to swallow without great pain, if at all. He becomes greatly emaciated; the stomach and bowels show signs of great disorder, partly from irritation, and partly from want of proper nutrition; vomiting is frequent, and diarrhœa almost constant, with watery or green-colored stools. The skin is hot and dry, the mouth hot, swollen, red, and covered with aphthæ, the dribbling is excessive, and the pulse quick but feeble.

When the disease extends to the pharynx, the glands are apt to enlarge, and the irritation or inflammation may extend to the trachea, altering the character of the voice, and rendering it harsh and hissing.

When the thrush is secondary, or when complicated with other organic affections, the symptoms of the primary or secondary disease may predominate, so that the thrush will appear merely as an aggravation.

Pathology.—I have already stated that muguet and aphthæ differ, in that the former is a secretion or vegetable growth deposited upon the surface, and the latter an ulcerative process beneath the epithelium. Dr. Bateman defines the disease thus: "The aphthæ are small whitish or pearl-colored vesicles, appearing on the tongue, the lips, and the interior surface of the mouth and throat, generally in considerable numbers, proceeding to superficial ulceration, and terminating by an exfoliation of white crusts."* Some writers have classed them as pustules, others as ulcers, without investigating their seat. Bichat, with his usual acuteness, started the question as to whether they were an affection of the chorion of the mucous membrane, or of the papillæ, or of the follicles; a question which Gardien hesitated to answer, but upon which the researches of Billard have thrown much light. He regards the disease as an inflammation of the muciparous follicles of the mucous membrane. In an early stage of the inflammation, they appear on the internal surface of the lips and cheeks, on the pillars of the velum, and the palatine arch, and the inferior surface and lateral parts of the base of the tongue, under the form of small white points, sometimes exhibiting a colored spot in their centre, slightly prominent, and often surrounded by a slightly inflammatory circle. "The folli-

* On Cutaneous Diseases, p. 263.

cular points enlarge, preserving also their circular primitive form, and from their central aperture there soon issues a white matter, which is at first compressed by the epithelium, but which escapes on that membrane becoming ulcerated. The follicle, when ruptured, is no longer a prominence, but a superficial ulcer with rounded edges, sometimes sharply defined, more or less tumefied, and almost always surrounded by an inflamed circle, of a fiery red. The border and centre of this slight ulcer often secrete a white pultaceous matter, like a slight scab, which is separated and expelled with the saliva.”*

Berg, Robin, Gruby, and Green,† however, consider the disease as a vegetable growth, the spores of the plant adhering firmly to the isolated or imbricated epithelial cells, and that the number of spores greatly exceeds the filaments.

The vesicular or pustular character of the aphthæ, then, appears to be owing to the limitation by the epithelium of the space occupied by the white matter issuing from the follicular orifice, and certainly the appearance is sufficiently exact to justify Bateman’s description. The distinctive character which is practically important, appears to be the small ulcer with its inflamed base. These aphthæ appear first on the edges of the tongue, the angles or inside of the lips, from whence they spread with more or less rapidity over the tongue and inside of the cheeks to the fauces; and as they will be found in different stages, the mouth acquires the appearance of irregular superficial ulceration with white cream-colored sloughs. That the œsophagus and even the stomach may be thus affected is admitted by most writers, but they are not agreed as to whether the disease may extend lower. Moss‡ and Underwood§ notice the appearance of aphthæ at the anus, and assume this as a proof that the disease extends through the bowels; and Bateman mentions that such extension of the disease is supposed to take place, but very properly observes that the redness and partial excoriation about the anus, so frequently observed in the complaint, may be owing to the acrid nature of the discharges from the bowels. Armstrong|| states that from the œsophagus “it is continued quite through the stomach and intestinal canal to the anus, at least it makes its appearance very plainly at this part.” Marley observes: I saw a case some time since, where I had little doubt but the disease ran its course to the verge of the anus;¶ and Gardien mentions this extension as a fact well known. Dr. Bateman notices that the trachea is occa-

* Mal. des Enfants, p. 209.

† Med. Times, July 26, 1851.

‡ On the Management and Nursing of Children, p. 188.

§ Diseases of Children, p. 155.

|| Ibid. p. 24.

¶ Ibid. p. 52.

sionally affected with aphthæ, but that they very rarely extend to the nose.

When the aphthæ are numerous and coalesce, covered by the white sloughs, they resemble and may be mistaken for muguet, but a little care will avoid this error, for in the latter no ulceration can be discovered, and it is plain enough in the former, notwithstanding the crusts, and moreover we shall be able in some parts of the mouth to detect the enlarged follicles before exudation has taken place. These small aphthous ulcers may assume a more extended and formidable state of ulceration, and even become gangrenous; but there is an appearance which has been mistaken for gangrene, against which we should be on our guard. Billard thus describes it: "Sometimes, when the follicular points are ulcerated, the borders of the ulcers instead of being covered with a slight creamy exudation, exhale a small quantity of blood, which concretes under the form of a slight brown scab, mistaken by some authors, as in malignant sore throat, for a gangrenous eschar." "Before pronouncing these eschars to be gangrenous, the nature and causes of the brown scabs covering the aphthous ulcerations should be examined with the greatest care. This mistake might produce very serious consequences, for we might be led to treat with stimulants and tonics a disease which it would be more rational to treat by simple and antiphlogistic remedies."*

Causes.—We find the disease most common in pale, delicate, and unhealthy children, whose constitutions have been injured by neglect, bad food, vitiated air, want of cleanliness, and over-crowded habitations. It is not unfrequent with spoon-fed infants, and, as we might expect, it prevails very extensively in hospitals for children and foundling hospitals. Dr. Hamilton is of opinion that thrush is induced by "specific contagion," and Marley and others speak of the disease being excited in infants who had sucked from a breast previously used by a child so affected. It is said to have prevailed epidemically in some parts of Holland.

But though occasionally a primary affection, it is by far more frequently secondary to an affection of the alimentary canal, similar to that in muguet, or it is the result of deteriorated health and constitution resulting from various diseases.

Prognosis.—From what has been said, it is pretty clear that, when aphthæ are a purely local complaint, occurring in a tolerably healthy subject, few in number and distinct, there is no danger to the child. With proper treatment the white crust will fall off, and the little ulcer heal in a few days.

This is not the case in the severe form of the disease. The child is in great danger from the suffering, the want of food, the vomiting, and diarrhœa: if these be not checked, it will run down rapidly beyond the

* Mal. des Enfants, p. 211.

reach of assistance. Add to this the danger arising from the primary disease, or from subsequent complications, and it is evident that the case is a very serious one. The extension and coalescence of the apthæ, the dark color of the crusts, the unhealthy appearance of the small ulcers, the emaciation, the small quick pulse, &c. are very unfavorable symptoms.

Treatment.—Dr. Bateman observes very truly, that in the milder degrees of apthæ lactantium, slight remedies are sufficient to alleviate or remove the disease. The acidity in the first passages is often readily corrected by some testaceous powder, which, if the bowels be not irritable, may be joined with a little rhubarb or magnesia, or by the pulv. contrayervæ co. if they are in the opposite state and weakly. At the same time the nutriment of the patient should be regulated by attending to the diet and general health of the nurse; or, if the child be not suckled, by procuring a wet-nurse, when that is practicable, which often speedily cures the complaint.* If the surface of the mouth be very irritable and tender, the first local applications should be of a bland and soothing character: a little cream, or the yolk of eggs mixed with a little syrup of poppies, as recommended by Van Swieten; or the lips and tongue may be lightly covered with pure almond oil. By degrees, and in proportion to the decrease of the soreness, astringents may be applied, and of these perhaps the best is the borate of soda mixed with powdered sugar or honey. Dr. Armstrong speaks very highly of a “solution of white vitriol in barley-water,” in the proportion of half a scruple of the former to eight ounces of the latter at first, and gradually increasing its strength. For very young infants the juice of boiled turnips sweetened with sugar or honey. Etmüller and Dr. Shaw advise honey of roses and spirit of vitriol or sea salt, but Underwood thinks no application superior to borax and honey.

In severe cases of the disease the same astringents may be used locally, or we may wash the mouth with a weak solution of the nitrate of silver, which I have found beneficial; but unless we can change the state of the constitution we shall do but little good. For this purpose, if the child be still at the breast, the nurse should be changed; or the food, if the child be weaned. In addition to milk, barley, bread jelly, or arrowroot, we may give wine whey or wine and milk pretty freely. For older children we may order chicken broth.

If the stomach do not reject medicine, we may prescribe the hyd. c. creta, with rhubarb if the bowels be costive, or with the pulv. cretæ c. opio if diarrhœa be present. A drop of laudanum in milk, once or twice a day, will often quiet the bowels when more bulky medicine only irritates. If there be much vomiting, it will be better to administer these or analogous medicines by the rectum, and employ the stomach for nutriment only.

* On Cutaneous Diseases, p. 267.

Dr. Armstrong and others recommend us to commence by an emetic followed by a brisk purgative, but this will entirely depend upon the condition of the child when we first see it. If the stomach be loaded and the bowels confined, it may do very well, but in the majority of cases, especially if at all advanced, it would be somewhat hazardous. The following case, related by Marley,* is a good illustration of the value of Dr. Armstrong's suggestion in certain cases: "It occurred in a child about two years and a half old. The aphthæ were from the commencement of a brownish hue, and in the course of a day or two became nearly black; the teeth were loaded with a brownish fur; there was a copious flow of saliva; the breath was remarkably offensive, resembling much that of a person in a state of salivation; the pulse was of a quick and jerking nature; no appetite whatever; in fact, the mere appearance of food produced a sensation of nausea. There was universal lassitude. In this case I commenced with a dose of castor oil, which was retained on the stomach and operated well. This was followed the next day by an emetic, which brought away an almost incredible quantity of bilious matter for so young a child, after which I treated the case with bark and ammonia. The only local application used was a lotion composed of decoction of bark and muriatic acid. The case got well."

When the aphthæ assume a brown hue, or appear in a state of debility consequent on acute diseases, the general strength must be supported by light tonics and cordials, with proper diet: such as a weak decoction of cinchona or cascarilla, or the solution of the tartrate of iron, with rhubarb, light animal broths, and preparations of milk with the vegetable starches. Chlorate of potash may also be given in doses of from two to five grains, three times a-day.

Dr. Hamilton very properly lays great stress upon cleanliness, advising that the child should be washed all over, and a clean dress put on every twelve hours. If the anus should become excoriated, as often happens, it should be washed four or five times a-day with warm water, and, after being dried, may be bathed with lead lotion or black wash, or powdered with lapis calaminaris, or anointed with zinc cream.

* Diseases of Children, p. 53.

CHAPTER VI.

ULCERATED SORE MOUTH. ULCERATIVE STOMATITIS.

At first sight there appears a similarity almost amounting to identity between this disease and aphthæ, but in the latter the disease is limited to the muciparous follicles, the ulceration commencing around their orifices ; in the former the inflammation of the mucous membrane may run on into ulceration at any part and in an irregular manner. Aphthæ occur also in young infants, but Rilliet and Barthez have found ulcerated sore mouth more common after five years of age.

Symptoms.—According to M. Taupin,* the disease commences in the gums, which are swollen, red or violet, bleeding, and soon covered with a soft layer of grayish matter. From the gums the inflammation and ulceration spread to the corresponding portion of the mucous membrane lining the mouth and lips, the small whitish spots by which it commences enlarge and coalesce until they form the large gray patches covering the erosion or ulceration. Generally speaking, the lesion is of small extent, affecting the gums, and exhibiting a few patches inside the cheeks or lips, more frequently one side than both, and oftener the left than the right, according to Rilliet and Barthez ; but in some rare cases it is much more extensive, involving the vault of the palate, as well as the other parts of the mouth.

If the treatment fail and the inflammation persist, the patches increase in thickness by the secretion of additional layers, and the ulceration deepens ; the layers of false membrane are detached and quickly renewed, and thus the disease is perpetuated. If, on the contrary, the inflammation diminish, the patches are thrown off, the ulcers become cleaner and fill up, and there raised borders subside. Then the epithelium is reformed, and there remains only a deeper redness, marking the situation of the ulceration. M. Taupin states that the mucous membrane in these places remains thickened and somewhat hard, but Rilliet and Barthez regard the submucous tissue as the seat of this thickening.

The submaxillary glands are swollen, and if the attack be severe they become hard and painful, but the surrounding cellular tissue does not participate in the inflammation. The breath is generally offensive, and when the disease is extensive the odour is not unlike or much inferior to what we observe in gangrene. In severe cases we find externally considerable swelling corresponding to the ulcerations, and when

* Journal des Connois. Méd. Chir. No. 10, April, 1839.

pressed it feels soft, quite unlike the hard, resisting, circumscribed swelling in gangrene; the skin is neither smooth, nor shining, nor hot. More or less salivation attends the complaint. If severe, the mouth is kept open, the lips protruding, and the saliva dribbling over the swollen and ulcerated surface. This appearance is very characteristic of the disease.

The suffering is very considerable; the child is restless and uneasy, moaning and putting its fingers to its mouth, and finding it more or less difficult to eat or drink. In severe cases, with infants, sucking is out of the question, and the child can only be nourished by the spoon. There is almost invariably some derangement of the stomach and bowels, often preceding, always following, the affection of the mouth. Occasionally the symptoms of entero-colitis are very marked, and such complications, where primary or secondary, not only augment the distress and suffering of the patient, but materially influence his condition and add to the danger. When the inflammation is moderate, the heat of skin will be natural and the pulse unaltered; but when of considerable extent and intensity we shall find more or less fever, with a quick and rather weak pulse, loss of appetite, disordered bowels, emaciation, &c.

The disease may be prolonged for some time, although, generally speaking, it is not very tedious. Much will depend upon the constitutional condition of the child, upon the primary or secondary complications, and upon the extent and depth of the ulcerations, the deeper ones requiring more time to fill up: moreover, the child is very liable to relapse.

Pathology.—The disease commences as stomatitis, as already described. The mucous membrane of the mouth is swollen, inflamed, and hot, sometimes of an equally diffused redness, sometimes in patches; the gums are also swollen, red, and spongy. After the inflammation has continued for some time, we find a number of small whitish, or yellowish patches, slightly prominent. Beneath the epithelium, which is thicker than natural, we find these whitish points to consist of a pseudo-membranous secretion, similar to that found in the pustules of smallpox on the eighth or ninth day. This concretion is pretty firmly adherent to the subjacent parts, and covers a small ulcer with irregular borders, which bleed when touched, and of uncertain form, sometimes round, sometimes longitudinal. If the disease increase, this false membrane forms a yellow, broad, and thick layer, underneath which we find a co-extensive superficial erosion of the mucous membrane.

This is the milder form of the complaint. If not checked, the ulceration deepens, the edges are red or of a violet color, and the surface covered with a reddish-gray layer. When the gums are mainly affected they appear red or violet, swollen, softened, bleeding, and covered with a pultaceous secretion. The ulceration spreads transversely, and is rather narrow, and by the destruction of the gingival tissue, the teeth are loosened, and sometimes fall out. The ulcerations of the tongue

and inside of the cheeks are of a rounded form; those of the lips and their commissure are longitudinal and spread rapidly.

Causes.—Although an infant may be the subject of ulcerated sore mouth, yet both M. Taupin and MM. Rilliet and Barthez state that they have found it more frequent in children from five to ten years of age than at any other period, and in boys than girls.

Like other kindred affections of the mouth, it may appear at the time and connected with dentition, and it may be dependent upon disordered state of the stomach and bowels, or a deteriorated constitution, which in children so certainly results from insufficient or improper food, want of cleanliness, vitiated air, damp or unwholesome dwellings, or the crowding together too many individuals into too small a space. It may also occur in the course of other acute or chronic disorders, as pneumonia, eruptive fevers, &c. which entail constitutional injury.

It is endemic in certain wards of the Hôpital des Enfants Trouvés, according to M. Taupin, who also believes it to be contagious, *i. e.* to be communicable by using the same spoon for feeding, &c. And occasionally also it appears to prevail as an epidemic.

Treatment.—The first indication is to remove the predisposing and exciting causes if possible. Thus, if the child be young and have been spoon-fed, we ought to procure a wet-nurse for it, if it be not too old to suck; and if already weaned, the food should be changed. If it occur at the period of dentition, the gums should be freely scarified, and the child removed away from its companions to a dry, airy apartment, and kept scrupulously clean. Even if the teeth are complete, we shall often derive benefit from slightly scarifying the gums; or if the inflammation be severe, applying a leech or two to other parts of the mouth.

If this be not necessary, or after it have been done, the mouth should be carefully washed by means of a syringe and warm water, or a piece of lint dipped in water; we shall then be able to judge accurately of the state and extent of the ulcerations. In slight cases it will be sufficient to wash the mouth with emollient or mucilaginous or slightly acidulated lotions, or to apply powdered sugar, or a weak mixture of borax with honey or sugar.

If these milder remedies fail, we may try M. Bonneau's plan, and apply the dry chloride of lime or powdered alum. The end of the finger, or the end of a small roll of linen, should be moistened and dipped in the powder, and gently rubbed over the ulcers twice a day, and this application must be continued until the surface is healthy and beginning to heal. The mouth should be cleaned with a syringe and water a few minutes after each application. In ordinary cases I have found the borax and honey in the usual proportions to answer the purpose exceedingly well. Dr. West regards the internal administration of the chlorate of potash as almost specific. He prescribes from three to five grains, dissolved in water and sweetened, every four hours—previously giving a purgative, if the bowels be confined.

But in very severe cases, before applying the borax and honey or

alum, it will be necessary to touch the surface of the ulcers with nitrate of silver, or even muriatic acid, or the acid nitrate of mercury, and, after the slough has separated, then to have recourse to the milder applications. It sometimes happens that a carious tooth, though it may not have originated the inflammation, will certainly augment and perpetuate it. In such cases, it will be advisable to have it removed, as a preliminary to other treatment.

Very great attention must be paid to the state of the stomach and bowels. If disease exist there, it will be in vain that we treat the mouth judiciously if that be neglected. Purgative medicine may be necessary, or diarrhoea may require to be checked; and if there be evidences of more serious disturbance, for example of entero-colitis, it must at once be treated in the way we shall mention hereafter. The same may be said of every other complication, whether primary or secondary. The diet must depend a good deal upon the state of the constitution. If the child be exhausted or broken down, broths may be given freely, and wine whey may be necessary; but if it be a local affection merely, and the child otherwise robust and healthy, moderate or even low diet will be advisable.

CHAPTER VII.

GANGRENE OF THE MOUTH. CANCRUM ORIS. GANGRENOUS STOMATITIS.

THIS very formidable disease has been noted more or less cursorily by the older writers: for instance, by Butter, in the sixteenth century; Van der Voorde, who called it *waterkanker*; Van Swieten, who gave it the name of gangrene; Boot, Berthe, Dease, &c.; but we are indebted for our more accurate knowledge of the disease to the researches of Baron, Isnard, Guersent, Constant, Taupin, Richter, Cuming, Duncan, Hueter, Rilliet and Barthez, &c. It has been described under various names, as water-canker, noma, gangrene of the mouth, cancrum oris, stomacace, necrosis infantilis, cancer agneux des enfans, &c.

Symptoms.—Mr. Cooper gives the following definition of the disease: "A deep, foul, irregular, fœtid ulcer, with jagged edges on the inside of the lips and cheeks, attended with a copious flow of offensive saliva. It is a perfect specimen of phagedenic ulceration, and in its worst forms not unlike hospital gangrene, as I have seen in several deplorable in-

stances. It also resembles the ulceration and sloughing in the mouth produced by mercury.*

There appear to be several phases of the disease, differing in degree, if not more essentially. One variety is described by Dr. Cuming, of Armagh, as occurring in children between twenty months and seven years of age. "The ulceration commences generally in the gums, from whence it extends to the lips or cheeks. Sometimes it is of an acute, sometimes of a chronic nature, and as it approaches to one state or the other it is more or less attended by sloughing. In the very worst cases, however, though the sloughing is considerable, the ulceration is always predominant, and by its means the destruction of parts is principally effected. This form of the disease, which seems to answer to the affection described as *cancrum oris* by authors, bears a resemblance in some respects to the ulceration and inflammation of the mouth produced by mercury."† I must say that this form of disease hardly deserves the name of gangrene; it appears to me rather to have been an aggravated form of the ulcerative stomatitis just described.

Another variety has been described by Richter‡ and others, in which we find spots of gangrene, limited in extent, at the angles of the lips or upon the cheeks, occurring suddenly and with little general disturbance. In some instances, there is a red spot for a few days preceding the gangrene. When the sloughs separate, we see that the gangrene was but superficial, there being very little loss of substance. Such cases are apt to occur after acute affections of the skin, as measles, scarlatina, smallpox, &c. and generally heal without trouble.

Dr. Marshall Hall has published six cases, in five of which the disease commenced externally in the lip or cheek: "In one case the patient did not survive the extreme irritation of the system in general, which attends the commencement of this affection: in four others life was prolonged until a considerable portion of the soft part of the face and mouth was destroyed by mortification, and the latter patients died from exhaustion. In a sixth the patient survived the affection altogether, after experiencing an extensive sphacelation of each cheek, of a part of the tongue, and of the contiguous gums, and even of a portion of the jaw-bone." "In this disease frequently, when the little patient has appeared to be convalescent from the previous indisposition, some part of the face has been affected with pain, induration, swelling, and erythema, and the child has become cross, irritable, feverish, and restless. At no distant period, usually on the succeeding day, a dark purple or livid spot has appeared, which has soon assumed a dark brown colour, losing its purple hue, and at the same time its vitality. When the patient survives, the sphacelated part enlarges and becomes black, sepa-

* Surgical Dictionary, p. 332.

† Dublin Hospital Reports, vol. iv. p. 341.

‡ British and Foreign Med. Rev. vol. vii. p. 470.

rated, loose, and extremely fœtid; the living part retains an erythematous redness, bordered by a ring of a livid hue. The internal mouth is soon involved in the affection, the sphacelus spreading into this cavity; the teeth become loose and eventually fall out, and the breath is shockingly offensive. The child, from being restless, becomes more tranquil and patient; it seems frequently conscious of the disgusting appearance of the affection, and dislikes to be noticed; but there is often eventually dozing or coma. In the latter stages there is not so much heat of skin, but the pulse is frequent.*

My friend, Dr. Duncan, of this city, has more recently published a very interesting account of an epidemic resembling this disease which occurred in the North Union Workhouse:—"The age of the patients varied from about a year and a half to five years. I have no reason to believe it infectious, but in more than one instance it attacked a second member of the same family. Generally speaking, the attack was preceded for some days by diarrhœa, but, from the period of life corresponding often with the occurrence of dentition, this feature was not always sufficient to attract the attention of the mother, and little was done to arrest its progress till the condition of the mouth was observed. The children at first did not seem to suffer pain in the bowels, and would bear the usual pressure of manual examination, without inconvenience. The alvine evacuations were usually unhealthy, but they differed in appearance in different cases. Sometimes they were thin and watery, but not deficient in bile; more generally they were whitish and exceedingly offensive; and in almost all of them blood was discharged, either in a fluid state or mixed with a jelly-like mucus. When this diarrhœa had continued a week or ten days, the mother would mention that the child had a sore mouth, and on examination it would be found that the gums were ulcerated and the fangs of the teeth exposed, and covered with a yellowish-white sordes. According as the disease advanced the gums lost their pale flesh color, and became red, swelled, and spongy, and the margins exhibited a tendency to bleed, both spontaneously and on being touched." "The breath gradually became offensive, and the secretion of the salivary glands increased, so that the saliva used at times to flow from the mouth, and even to wet the pillow on which the patient lay. Partly from the attending fever, but principally from the tender and inflamed state of the gums, the children were unable to take food, but their thirst was often excessive. In no instance did I observe the teeth to fall out, probably because, in fatal cases, death took place from the constitutional irritation running so high before the local affection had time to produce its legitimate effects." "At first the disease did not appear urgent, but as soon as ulceration of the gums took place, and especially if appropriate means to arrest its progress were not adopted, it advanced with considerable

* Edinburgh Medical and Surgical Journal, vol. xv. p. 547-8.

rapidity to a fatal termination. When this event occurred, it seemed due rather to the violence of the attending fever, or the intractable persistence of the diarrhœa, than to any peculiar changes effected in the condition of the mouth. In some of the cases the disease seemed to be arrested for a time, the diarrhœa being completely checked, the alvine evacuations improved, the appetite restored, and every symptom of permanent convalescence being visible, when, after a time, the former symptoms would return in a severer form, and, resisting all measures of a remedial nature, hurry the victim to the grave.* Even this epidemic can hardly be considered as a severe form of this disease: if it were more than severe ulcerative stomatitis, it was a comparatively mild form of gangrene.

At the risk of being tedious, I am tempted to extract a very graphic description of the local phenomena of this disease by M. Wunderlich.† He describes two forms. In the *first*, “the disease directly shows itself to be gangrene. This is *noma*, using the word in a limited sense, or the *stomatite charbonneuse* of Taupin. One-half of the face (usually the left) exhibits an indistinctly defined pale or violet marbled swelling, especially on the eyelids, with a peculiar oily appearance of the skin. An erysipelatous redness of the cuticle is also frequently observed. The inner surface of the cheek is livid and of a dark red color. A small vesicle (which is often overlooked) now appears, generally on the outer surface of the cheek, near the mouth, but sometimes on the mucous membrane, and lying on a hard, dark red, and often livid ground; this vesicle shortly bursts and becomes converted either into a superficial erosion, or a deepish ulcer, which usually becomes soon covered with a slough of considerable size, measuring in diameter from several lines to an inch. It occasionally happens that there are several distinct points of origin of the morbid process, which either unite or remain isolated. The hardness and œdema of the surrounding parts increase until the whole face and occasionally the neck are swollen. An excess of saliva, often bloody or of a bluish color and of a fœtid smell, dribbles from the mouth. Mastication is difficult, if not impossible, while the voice becomes indistinct and speaking difficult. The external sloughing goes on extending, while the parts beneath become so rapidly affected, that in a few days, the cheek, a part of the lips and the eyelids are reduced to a gangrenous highly fœtid pulp; and there is then a lateral opening into the mouth. The teeth, which may be observed through the opening, become loose or fall out after the destruction of the gum; and the adjacent portions of bone become to a greater or less extent exposed and destroyed. The whole neighbourhood of the gangrenous spot has a sodden, livid appearance. In this destructive process, which is almost always limited to one side of the face, and which extends

* Dublin Journal, vol. xxviii. p. 3.

† Handbuch der Pathologie und Therapie, vol. iii. p. 701.

much more widely on the inner surface of the cheek and in the cavity of the mouth than externally, there is a perfect absence of pain or at most a dull sensitiveness. In the rare cases in which the gangrene is arrested, there is formed an inflammatory (hyperæmic) line of demarcation, suppuration commences in the circumference, and the gangrenous spot becomes converted into an ulcer, which gradually assumes a clean and healthy appearance, and after cicatrizing for some months, becomes healed. When there has been great destruction of tissue, cicatrization is always attended with considerable disfigurement, and the pre-existence of gangrene of the mouth may be recognised through life by the ugly, strongly-contracted cicatrix, puckering the eyelid, the ear or the neck, uncovering the eye and distorting the mouth, like the scars left on the face after deep burns. The *second* form appears to be incomparably the more frequent of the two. It is however less strongly marked, and owing to its greater affinity with other affections and a deficiency in correct observation, there is much discrepancy in what has been written on it. It runs a slower course than the former, and does not so frequently break out with suddenness during convalescence from acute diseases. Instead of the gangrenous destruction with which the first form commences, we here have pseudo-membranes of unhealthy appearance on the inner surface of the cheek, and ulcers either there or on the outside of the cheek and at the corners of the mouth. They either gradually or at once assume a very unhealthy character, emit a powerful and fœtid color, and become covered with sloughs or viscid masses, while the neighboring parts become livid and œdematous and the destructive process affects the deeper tissues. From this stage its further progress is similar to that of the first form, excepting, indeed, that the gangrene does not usually extend with the same extraordinary rapidity.*

In the severe form, the disease always commences in the mucous membrane, preceded by stomatitis, aphthæ, or ulceration of the gums, lips, or inside of the cheeks, and occasionally slight œdema. This state may persist for several days, or gangrene may set in the first day. Then the bottom of the ulcer becomes covered with a layer of gray matter evidently gangrenous, and the subjacent tissues are swollen and hard. When this tumefaction takes place in the cheek, it may be felt like a kernel, and the skin outside is tense, shining, and white in the centre. From this moment the ulcerations extend rapidly; at first of a grayish color, they shortly become brown and black, covered with "putrilage," of a fœtid odour, and bleeding when touched. The edges are sometimes regular, sometimes irregular, and raised or level, according to the progress of the ulceration, which in a few hours changes their appearance. The portions of the mucous membrane of the mouth in contact with the gangrenous spots become likewise

* British and Foreign Med.-Chir. Review, July, 1850, p. 52.

affected, and run the same destructive course. In all directions the disease extends fearfully, laying bare and destroying the bones. In a short time a livid spot is perceived in the cheek, in the centre of the kernel just mentioned; this spot is surrounded by an inflamed base, and is soon perforated by ulceration, which from thence spreads rapidly, and in some cases destroys the entire cheek. The gums struck by gangrene are destroyed, leaving the teeth bare and loose; the bones of the jaws are affected with necrosis, and exfoliate if life be sufficiently prolonged. "The parts," says Mr. Dease, "were continually soaked in a cold, putrid, offensive ichor, until often the whole side of the face was eaten away, particularly the lips, so that the jaw-bone and inside of the mouth were exposed to view." "In this situation I have known children to live until the entire jaw-bone had fallen down on the breast, and the whole side of the face become a mass of putrefaction."*

As already stated, the primary disease of the mouth is inflammation and ulceration, upon which gangrene supervenes, and the early symptoms are those I mentioned when describing that form of disease. The superaddition of gangrene appears in some cases to give rise to but little constitutional disturbance, and the child presents the same general aspect as formerly. Premonitory symptoms, M. Wunderlich remarks, are only observed when the affection appears as gangrene and is developed in the advanced stage of improvement or convalescence of a pre-existing disease (measles, &c.), for when there is pseudo-membranous or ulcerative stomatitis, the gangrenous mortification is only announced by a gradual exacerbation of the symptoms, or at most by a shivering, an increased appearance of collapse, hemorrhage, &c. When the gangrene supervenes at the height of some other disease, these premonitory symptoms are rarely observed. It even frequently happens that when the earlier disease has abated to a very great degree and convalescence is considerably advanced, this fatal secondary affection will manifest itself unannounced by any premonitory symptoms, commencing unexpectedly and suddenly by local swelling. The premonitory symptoms, when they occur in these cases are not very severe, as for instance, lassitude, irritability, loss of appetite, disordered digestion, rigors, slight fever, and a somewhat suffering and collapsed appearance.

In other cases the child, already weakened by previous disease, is cross, feverish, and restless, with a quick pulse and hot skin, suffering much pain from the mouth until the gangrene is completely established. Then the fever seems to subside, for although the pulse remains very quick, the skin is cooler, the restlessness diminished, and the aspect more calm. The face is of a dull pale color, and has, if I may so speak, a dead look about it. The eyelids are not unfrequently swollen, the

* Observations on Midwifery, &c., p. 126.

nares incrustated, and the *alæ nasi* dilated in respiration. The lips are swollen, and frequently exhibit their share in the mischief going on. Altogether the face has a singularly depressed and sorrowful, though tranquil expression. The saliva is secreted abundantly, and escapes from the mouth, owing to the pain and difficulty of closing it. At first it is the ordinary secretion in excess, and perhaps tinged with blood, but afterwards it becomes brown or black, mixed with gangrenous detritus. The breath is extremely offensive from the beginning, but when gangrene is established both the saliva and breath exhibit the characteristic fœtid odour. The tongue is moist, sometimes yellowish or loaded, and occasionally exhibiting the color of the gangrenous spots. The thirst is intense, vomiting rarely occurs, and the appetite is not so completely destroyed as we might expect; in fact, when it does fail, it seems rather owing to the complications than to the disease of the mouth. The bowels are almost always deranged; diarrhœa is generally present; sometimes griping, with watery stools of a greenish or yellowish color. In a considerable number of cases the intestinal disorder seems to have preceded the gangrene, and to have constituted the primary affection. The strength of the child is greatly reduced; it is emaciated, weak, and helpless.

It has already been stated that gangrene may attack the ulcers on the first day; more generally, however, we find it set in from the third to the sixth day, and from that time the disease spreads, until, after more or less destruction of the tissues, it proves fatal at a period varying from five to eighteen days. During this time, nothing can be conceived more distressing than the condition of the poor child, or more heart-rending than its appearance.

As may be supposed, the great majority of cases terminate fatally, but some few cases do recover, mainly those in whom the disease is primary, the constitution good, and which remain free from complications. The improvement may take place before the gangrene has spread deeply, and then the mortified portion is cast off, leaving a greyish but more healthy ulcer; the swelling of the surrounding parts diminishes, and the constitutional symptoms improve. At a later period, should a favorable change occur, the entire gangrenous portion, both the mucous membrane and the cutaneous eschar, will be thrown off, leaving a granulating surface with healthy suppuration; the dead bone will exfoliate, and the wound gradually fill up and contract. Some writers have stated that the form of *cancrum oris* which commences externally on the cheek is more under the control of remedies than the other forms; and Dr. Condie considers that the disease is less frequent in America than in Europe, and more manageable.

A peculiar form of gangrene occurs from the use or abuse of mercury, and it is of importance to know that it may arise from a very small quantity. Dr. Stokes has mentioned to me one case in which gr. iss of calomel, and in another 7 grs. had been taken, and in a third 5j of ung. hyd. had been rubbed in, and all had the disease severely. It

commences by a livid tumor at the angle of the mouth or behind it, which increases, ulcerates, and eats away the cheek and even part of the eyelids. The gums are dry and hard, and there is no salivation. It may occur at any age, but Dr. Stokes has seen it chiefly in young girls of 10 or 12 years.

The disease may be primary or secondary, as I have said, but it is not always easy to decide whether the complications have preceded the disease or followed it, so little attention has been paid to them comparatively.

We know that intestinal disorder is a frequent concomitant; it will certainly arise in the course of the disease, but it appears probable that in some cases the gangrene itself is rather a complication symptomatic of the state of the gastro-intestinal mucous membrane.

Another very frequent and very important complication is pneumonia; it occurred in eighteen out of twenty of Rilliet and Barthez's cases, and will require our most careful attention if we hope for success in our treatment. Whether primary or secondary is comparatively of little consequence; it is in itself so serious that it must necessarily exercise a predominant influence both upon the course of the disease and of the treatment, for if the gangrene were cured the patient would incur nearly equal risk from the pneumonia in his exhausted condition.

Pathology.—MM. Rilliet and Barthez have given a minute analysis of the pathological changes in the different structures, effected by the gangrene, drawn from the *post-mortem* examinations of twenty-one cases they witnessed. I shall venture to give a short abstract of their record.* After death the portions of the *skin* surrounding the gangrene rapidly putrefy, and the cheek or the lip is swollen, purplish or greenish, tense and shining, hard to the touch, and exhibiting a profound circumscribed tumefaction. At the most prominent point we find an eschar, either well-defined, round, or oval, and of a moderate size; or it may be large and irregular, extending in different directions towards the nose, eyes, and ears, even in some cases occupying nearly the entire face. In the latter case the tumefaction is less, and not circumscribed. The depth of the eschar varies. The *mucous membrane* was always affected, sometimes in a limited and regular manner, and sometimes irregularly, and more extensively. The surface was reduced to a semifluid "putrilage," of a gray, brown, or black color, removable with the scalpel, and beneath which loose shreds of the mucous membrane were perceived. The gums shared in the destruction. When the gums were thus destroyed the *bones* were exposed and became black, sometimes affected by necrosis, and exfoliated. This destruction was commensurate with the extent of the gangrene of the mucous

* Mal. des. Enfants, vol. ii. p. 129, *et seq.*

membrane. The *teeth*, denuded and deprived of their support, became loose, and were easily detached, often falling out of themselves.

The *intermediate tissues* were congested, and participated more or less in the gangrenous affection. In the milder cases, the adipose tissue was infiltrated with serosity, as were also the muscles; and such of these parts as were not actually touched by the gangrene were distinctly recognisable. But as the disease advances, or in more severe cases, mortification attacks these tissues, especially those nearest the mucous membrane, so that the brown putrefied layer is of considerable thickness (five to eight millimetres), beneath which we find the adipose tissues, and the muscles, infiltrated with serous fluid, losing their distinctive organization, and becoming homogeneous, whilst nearer the skin there is a layer of cellular tissue, hardened and infiltrated, but not mortified. It was rare to find the entire thickness of the cheek affected by gangrene. The condition of the vessels and nerves has always appeared doubtful. In one case, examined by M. Billard, he found "nothing remarkable." M. Taupin states that he often sought for them, but always found them confounded with other tissues, and impossible to distinguish from the softened gangrenous mass.* MM. Rilliet and Barthez give the following results of their investigation: "In six cases we made a long and minute dissection, and we found that when the vessels passed into a portion of tissue, infiltrated, but not affected with gangrene, they were perfectly healthy, permeable, and their coats scarcely thickened; that when they touched upon a gangrenous part, they were still permeable, but their parietes were thickened, and had somewhat the aspect of the gangrenous portion. Lastly, when they traversed a gangrenous portion, it was still possible to trace them through it, but that the entire extent of the vessel, as it traversed the mortified part, was closed from one side to the other, either by a small clot at either extremity, or by a larger one filling it throughout." Thus the artery was completely obliterated in three cases, and in as many the vein was filled with "liquid putrilage." The coats of both were thicker and softer than natural. Once only the nerves were examined: externally they appeared like the surrounding tissue; their neurilemma was gangrenous, but the pulp was sound in color and consistence, and appeared to have resisted the gangrene. The following details show the comparative frequency of the seat of the disease in twenty-nine cases:—

The left cheek (externally or internally) was affected in	11 cases:
The right cheek	10 "
The lower lip	4 "
The lower lip and right cheek	1 case.
The upper lip and right cheek	1 "
The left cheek the angle of reflection of the mucous membrane and right cheek	1 "
The lower lip, extending to both cheeks and upper lip, on both sides	1 "

* Journal des Connois. Méd.-Chirug., April, 1830, p. 140.

So much for the condition of the parts involved in the gangrene; but the *post-mortem* examination revealed other lesions connected with this disease, either as primary or secondary complications, and which are of vital importance. The principal coincident disease was pneumonia, and the following summary exhibits the character and seat of this disease, and of the gangrene, in the same cases:—

Out of 20 cases there was found double lobular pneumonia in . . . 4	}	Of these, gangrene of the right cheek in 1
		Double gangrene, but especially of the left cheek, in 1
		Gangrene of the lower lip, in 1
		Gangrene of the lower lip and right cheek, in 1
Double lobular pneumonia, especially on the right side (with carnification in 2 cases) in . . . 5	}	Gangrene of left cheek in 3
		Gangrene of lower lip in 2
Double lobular pneumonia, especially on the left side, in . . . 6	{	Gangrene of right cheek in 3
		Gangrene of left cheek in 3
Lobar pneumonia of right lung in . . . 1		Gangrene of upper and lower lip in . . . 1
Lobar pneumonia of left lung in . . . 1		Gangrene of left cheek in 1
Carnification of left lung in 1		Gangrene of right cheek in 1
No pneumonia in 2	{	Gangrene of right cheek in 1
		Gangrene of left cheek in 1

Thus pneumonia (lobular or lobar) existed in eighteen out of twenty cases, and occasionally, though rarely, of the same side as the gangrene. This accords with the experience of MM. Baudelocque and Taupin.

In eight of these eighteen cases the pneumonia was secondary, having supervened in the course of the gangrene.

Other lesions, however, were discovered; as for example:—

Enterocolitis, or softening of the intestine in 14 cases.
Tubercles 9 "
Gangrene of the lung 3 }
Gangrene of the pharynx 1 } in 4 "
Pleurisy 1 "
Pneumothorax 1 "
Peritonitis 1 "
Pharyngitis 1 "
Nephritis 1 "
Infiltration of the pia mater 2 cases.
Hemorrhage into the arachnoid 1 case.
Rachitism 2 cases.

At first sight it might be supposed that the gangrene resulted from the obliteration of the artery; but this is not borne out by the fact that, so long as the mucous membrane is alone affected, the vessel is quite pervious; its obliteration must, therefore, be the effect, not the cause, of the gangrene.

Dr. Condie states that, in the examinations he made, the principal

organs in which morbid appearances were present were the stomach, intestines, and liver. In all the cases the two former presented the indications of inflammation of a more or less chronic character; the latter appeared to be affected with hyperæmia rather than any structural change. In the majority of cases the mesenteric glands were greatly enlarged. In the examination made at the Children's Asylum between June 1, 1827, and January 1, 1830, the morbid appearances exhibited were—enlargement and hardening of the mesenteric glands; a scrofulous condition of the glands of the neck; and, in some instances, tubercles of the lungs. In general the whole substance of the lung was thickly studded with tubercles in various stages of inflammation and suppuration. The condition of the gastro-intestinal mucous membrane is not recorded.*

In all the cases examined by Dr. Duncan, he found “either decided ulceration of the intestinal mucous membrane, or enlargement and increased development of the follicular glands. In one case the whole colon was an immense sheet of minute, circular, and deep ulcers; while the portion of mucous membrane which intervened was of a bright crimson hue.”†

Causes.—Cancrum oris is almost confined to infancy and early childhood. Of twenty-nine cases recorded by Rilliet and Barthez, nineteen were from two to five years old, and the remainder from six to fifteen. Of Dr. West's six cases, two were between two and three years old; one, three; one between four and five; one at six and a quarter; and one at eight years old. It does not appear, however, as was thought by Dr. M. Hall, to affect female more than male children.

As might be expected, we meet the disease most frequently among the poor, and for obvious reasons. Their children are badly nourished, living in foul air and crowded rooms, surrounded by and participating in all kinds of uncleanness. Add to these exciting causes a delicate constitution and lymphatic temperament, and we seem to have all the elements for the production of the complaint. Probably for the same reasons it appears endemic in crowded hospitals for children, as, for instance, in the Children's Hospital at Philadelphia, where out of 240 children, seventy were at one time affected with the disease; and in other hospitals also. Certain localities, likewise, seem peculiarly favorable to it. It is said to prevail on the coasts of Holland, Sweden, and Denmark. According to the testimony of Thomassen and Thyssen, it prevailed epidemically in the Netherlands, as a consequence of gastric fever; and also, in 1838, in the Philadelphia Almshouse.

I believe that few if any authors maintain that gangrene of the

* Diseases of Children, p. 168.

† Dublin Journal, vol. xxviii. p. 18.

mouth is contagious, although they prudently advise the separation of the healthy from those who are so affected.

We have already noticed certain complications of the disease, which may be primary or secondary; we must, however, inquire a little further, as to those diseases in the course of which cancrum oris has been found to occur most frequently. This point is one of great importance, because in the majority of cases it is a secondary disease, in some solely dependent upon another preceding it, or upon the state of the constitution induced by the latter.

M. Baron observes that "it is never a primary affection, but appears in children enfeebled by previous disease."* Mr. Dease remarks that, in all cases he had seen, the children "had a pale, bloated, sickly look, large belly," &c. Dr. Huxham, in his report for 1745, mentions, "I have more than once during this month witnessed a mortification of the mouth and fauces; and, besides, a caries of the cheek and os vomeris, which occasioned a very painful kind of death, and that, too, after measles." Dr. Willan refers to a gangrenous eschar of the cheek occurring in a case of scarlatina. Dr. Marshall Hall states that, "in all the cases which have come to his knowledge, this affection had been preceded by fever, acute disorder of the digestive organs, inflammation of the lungs, variola, rubeola, or scarlatina. This affection would, therefore, appear to be in some measure the consequence of the exhaustion, debility, or irritation induced by previous disease."† Dr. Cuming advances a similar opinion: "In every instance of this affection that I have met with, the constitution had been much debilitated by the existence of previous and long-subsisting disease. In two cases that fell under my observation, the disease occurred as sequela of measles; in another, in the advanced stage of dysentery; in a fourth, upon the termination of infantile remittent fever; but it is more generally observed at the close of the exanthemata than at that of any other of the acute affections to which children are liable."‡ In M. Poupail's seventy-two cases, the affection followed an attack of intermittent or remittent fever; in nine of Dr. Jackson's cases, it accompanied or followed an attack of bilious or remittent fever. MM. Rilliet and Barthez agree completely with the opinion of M. Baron already quoted: "The disease, in the course of which we have most frequently known gangrene of the mouth to occur, is measles. We have occasionally observed it in scarlatina, smallpox, and pneumonia. We have also known it follow intestinal affections, whooping cough, scrofula," &c. And they give the following summary of the primary diseases on which gangrene supervened:—

* Bull. de la Faculté de Méd., 1816, vol. v. p. 158.

† Edin. Med. and Surg. Journal, vol. xv. p. 548.

‡ Dublin Hospital Reports, vol. iv. p. 232.

On measles in	12 cases.
Smallpox and measles	1 case.
Scarlatina	1 "
Scarlatina and smallpox	1 "
(Supposed) cholera	1 "
Pneumonia, primary and secondary	2 cases.
Pertussis, with or without complication	3 "
Enteritis (chronic) and complications	1 case.
Peritonitis and softening of the intestines	1 "
Scrofula	1 "
Intermittent fever	1 "
Enteritis (acute)	1 "
Gibbosity, &c.	1 "
General tubercularization	1 "

In Dr. Duncan's cases, the primary disease appears to have been generally an affection of the intestinal canal, although several of the cases occurred after measles. Dr. George Kennedy mentions that it occurred in the course of malignant typhus fever.* "Of the six cases which I have observed," says Dr. West, "and three of which I examined after death, two succeeded to typhus fever, two to measles, one came on in a child whose health had been completely broken down by ague, and one supervened in a tuberculous child, who had been affected for many weeks with ulcerative stomatitis in a severe form."†

We have already seen that in ten cases out of eighteen the pneumonia preceded the gangrene, so that the latter disease may sometimes be primary and sometimes secondary to the pulmonary affection. Nor can we, I think, doubt that there may be an intimate relation between scrofulous tubercle of the lungs and cancrum oris. Thus we find that the diseases which are most frequently attended by gangrene of the mouth are eruptive fevers, as measles, scarlatina, smallpox, &c., intermittent and remittent fever, pneumonia, disorders of the intestinal canal, tubercles, and scrofula; while, on the other hand, pneumonia and entero-colitis are those which most frequently supervene in the course of cancrum oris. By several writers, we find the resemblance between gangrene of the mouth and mercurial ulceration pointed out; and it has been suggested by Bretonneau, Hueter, and others, that true gangrene may follow the excessive use of mercury when the mouth is inflamed.

Diagnosis.—The only disease with which cancrum oris is likely to be confounded is the one last described, viz.: ulcerated sore mouth. Both commence by ulceration, and in both we find salivation and a fetid odour; but in gangrene the ulcer is covered by a putrid layer, which soon becomes dark-colored; the ulceration extends more rapidly and further, there is more swelling, often an eschar on the lips or cheek, denudation of the teeth and jaw, and ultimately perforation and

* Med. Report of Cork-street Hosp. for 1837-38, p. 25.

† Diseases of Infancy and Childhood, p. 356.

destruction of the cheek. In ulcerated sore mouth, none of these latter characteristics occur.

Prognosis.—The prognosis is exceedingly unfavorable. Very few cases, indeed, recover; and even when the gangrene appears checked, the child has to contend against very serious complications. Twenty out of twenty-one of Rilliet and Barthez's cases died, and five out of six of Dr. West's. Still, as some have recovered, it is always our duty to use every remedy against the local disease without overlooking any primary or secondary affection which may exist.

Treatment.—There are four indications to be fulfilled in our treatment of the disease: 1. To limit the gangrene, change the character of the surface, and remove the fœtor of the discharges; 2. To invigorate the constitution of the patient; 3. To favor the separation of the eschar; and 4. To remedy the complications, either primary or secondary.

The first indication is most likely to be attained by the application of powerful caustics; weak ones are of no use. Moreover, merely to touch the gangrenous surface will have no effect; to succeed, the caustic must reach the healthy tissue. Therefore the layer of gangrenous matter must first be removed, or if the situation permit, the gangrenous surface may be cut away, and then the caustic applied carefully and liberally once or twice a day. Various caustics have been tried, and some with success. Klatoch cured one case with pyroligneous acid; Hueter with acetic acid; Constant by the acid nitrate of mercury; Baron by the actual cautery; and Rilliet and Barthez by nitrate of silver and chloride of lime. M. Baron advises that muriatic acid be applied to the gangrenous spots in the mucous membrane at the commencement, and that, when the external eschar falls, we should apply the actual cautery; or, what is still better, that the eschar should be incised crucially, and then the cautery applied. Successful cases thus treated have recently been published by an American writer, Mr. Obree.

Sulphuric acid has been successful in the hands of Bruineman and Courcelles. Mr. Dease speaks highly of the spirit of sea salt (muriatic acid), which was used with benefit by Van Swieten previously. "I began," he says, "at first to give it in decoction of bark or infusion of chamomile flowers, but I could not get children to take it for a continuance, or in such manner as to give it a fair trial. I therefore gave it in an infusion of red roses, which was strongly acidulated with it; this they took without reluctance. At the same time I had the gangrene frequently washed with a decoction of chamomile acidulated with the spirit of sea salt; and when the gangrene was considerable and the discharge large, dashing the parts with the decoction, by means of a syringe, will more effectually wash away the sanies. After this was done, I ordered it to be dressed with the honey of roses and spirit of sea salt, and over all the carrot poultice to be applied. The child, at the same time, should be well supplied with broth, jelly, &c., and

allowed wine liberally; good claret will answer best.”* Mr. Cooper prefers the strong nitric acid, with the internal exhibition of sulphate of quinine and dilute sulphuric acid.

Mr. Pearson extracted the diseased teeth and some pieces of bone, and directed a milk and vegetable diet, with bark, sarsaparilla, and elm bark. Locally he preferred the dilute mineral acids, burned alum, decoction of bark with sulphate of zinc, tincture of myrrh, &c. In addition to the stronger caustics, or in the intervals of using them, M. Baron recommends external and internal applications of camphor and quinine.

M. Billard advises frictions, either dry or aromatic, when the œdema appears; and as soon as the kernel is felt, the use of ammoniacal liniment, or a lotion of the hydrochlorate of ammonia. Richter and Rey derived benefit from the use of the chloride of the oxide of sodium. Dr. Condie found a strong solution of copper or zinc, applied twice a day, very beneficial; and in the Children’s Hospital, Philadelphia, nitrate of silver was the only local remedy employed, and the majority recovered. Creasote was very useful in the Philadelphia Almshouse, applied after incisions had first been made through the gangrenous sloughs.

After each application of the caustic for the purpose of separating the sloughs, the chloride of lime may be applied in order to destroy the odour, and it also acts as a stimulant. The mouth should be syringed freely and frequently, and the parts kept dry and clean. When an eschar appears, a crucial incision should be made, and the caustic applied and repeated every day until after the eschar separates. Rilliet and Barthez advise that the incision should also be filled with quinine. I need not say that if there be carious teeth or loose portions of bone, they should be removed, as they will keep up an unfavorable irritation.

For the purpose of invigorating the constitution, it will be necessary to administer tonics as liberally as the condition of the digestive system will admit. Bark may be given in form of infusion, decoction, or syrup, or we may prefer the sulphate of quinine from its smaller bulk; beginning with half a grain, we may increase it two or three grains three times a day. Dr. Cuming says: “In a few instances in which the disease had made considerable progress, I have known recovery to take place under the administration of the sulphate of quinine and carbonate of ammonia, but in none of these cases had the ulceration extended so far as to involve the outside of the lips and cheeks.” I have said that Mr. Dease advises the internal exhibition of muriatic acid; and whether we give mineral or vegetable tonics, they must be assisted by the liberal use of wine. We cannot, of course, state the exact amount,

* Observations on Midwifery, &c., p. 128.

but there need be no hesitation in giving as much as the constitution of the child will bear, according to its age, and with reference to the complications. Dr. Duncan found great benefit from the hyd. c. cretâ, with Dover's powder, and, although not at the same time, from acidulated decoction of bark, or infusion of calumba with nitric acid. In addition, he derived the greatest good from counter-irritation to the abdominal surface. His principal efforts were naturally directed to the causes of the intestinal disease.

The diet should be very nutritious,—broths, jellies, minced meat, &c.,—just as much and of the kind the child can best take. It will be necessary, however, to keep a constant check upon the tendency to diarrhœa, by chalk mixture with opium, or opium combined with the quinine or ammonia; or a drop of laudanum may be given once, twice, or thrice a day in milk. The child should be kept in a large, well-warmed, and well-ventilated apartment; but in our anxiety for pure air we must beware of draughts of cold, remembering the liability to pneumonia in this disease. The most scrupulous cleanliness, both local and general, should be observed.

I must repeat that the most anxious care and watchfulness of the physician should be directed to the complications. Knowing that inflammation of the lungs so frequently occurs (whether primary or secondary) in connection with cancrum oris, we ought daily to ascertain the condition of these organs, that by detecting the earliest incursion of the disease we may the more effectually apply the remedy. The same may be said of entero-colitis, which also complicates this disease. For the suitable method of treating these diseases, I must refer the reader to the chapters relating to them.

Dr. Stokes has found the mercurial cancrum oris manageable, if he saw the patient within twelve hours from the setting in of the disease. He recommends that the patient should be kept sitting up in bed, that relays of leeches should be applied to the livid tumor as frequently as the strength will admit, and that the strength should be kept up by wine and good diet. If the tumor be reduced before ulceration occurs, the patient will be saved.

CHAPTER VIII.

TONSILLITIS. CYNANCHE TONSILLARIS. QUINSY.

THIS disease, which consists of inflammation of those masses of mucous follicles called the tonsils or amygdalæ, and of the neighbouring mucous membrane, is sufficiently common in children of all ages and constitutions; and, because it is painful and subject to ocular investigation, has been noticed by almost all writers from Hippocrates to the present time. It is seldom so severe and acute in children as in adults, but is much more liable to take on a subacute form, enlarging these organs, continuing for a considerable period, altering more or less the tone of voice, and impeding deglutition, hearing, and occasionally the breathing.

Symptoms.—Generally speaking, the complaint commences with the symptoms of a cold; the child is chilly, creeping to the fire, or it has regular rigors followed by fever; it is uneasy, distressed, and cross, with a huskiness of voice and a sense of roughness in the throat, which is shortly changed for soreness and pain, especially in attempting to swallow. Sometimes, however, as Dewees has observed, it appears to be a purely local affection, without fever or any constitutional disturbance. In other cases, the fever continues to increase for a time; the skin is hot and florid, the face flushed and puffed, the pulse rapid and full, the tongue loaded and white, with red papillæ appearing through the white coating. The thirst is great; but there is great pain and difficulty in swallowing fluids especially. Upon examining the throat, to which we are led at once by the complaints of the child, we find one or both tonsils enlarged, of a bright or deep red color; the uvula, velum, palate, and pharynx, red, swollen, and œdematous, but generally more painful on one side than the other, and on the surface we find more or less of thick, viscid, mucous secretion. In some cases, patches of coagulable lymph may be observed on the tonsils, giving the appearance of small sloughs. The extent of the swelling varies according to the intensity of the attack. In severe cases, the tonsils are so much enlarged that they almost close the pharynx, and protrude the swollen uvula forwards; and not only so, but the deeper tissues appear involved, so that the neck appears enlarged, and, from the interruption to the circulation, gives to the face and neck a flushed or congested look. Beneath the angle of the jaw, the tonsils may be felt enlarged, hard, and painful, and the carotids are seen beating strongly. The child complains of soreness of the throat, and is continually attempting to detach and expectorate the viscid mucus. Swallowing is very painful, but with soft solids less than with fluids; more so

with the saliva than anything else, because of the increased muscular effort required, and the consequent pressure upon the inflamed parts. There are darting pains from the fauces to the ears, frequently some degree of nausea; and in a few cases, we find respiration impeded; but this, I am convinced, is rare, the rapid and hurried breathing being ordinarily owing to the fever. The fever may run very high, and delirium be an attendant upon the disease.

This description, however, is rather of a very severe case than of the form ordinarily observed, which is marked by fever, soreness of throat, dysphagia, and inflammation of the tonsils, neither extremely distressing nor very persistent under ordinary management.

After a duration varying from a day to ten days or a fortnight, the attack may terminate in either of three ways.

1. In the great majority of cases it terminates in resolution, by the gradual subsidence of the fever, the diminution of the inflammation, and the reduction of the swelling; after which there remains a remarkable degree of weakness and lassitude.

2. In those cases where the inflammation is subacute, or in those where the inflammation, at first acute, subsides only to a certain point, we have less fever and less suffering, but the disease does not subside so frankly as in the others. The fever and distress may disappear, but the swelling of the tonsils does not; they remain enlarged, as it were hypertrophied, for a long time, or permanently, in lymphatic or scrofulous children: they feel soft, but of two or three times their natural size. There is no pain, but some difficulty in swallowing, and in all cases an alteration in the voice, similar to what is popularly called "speaking through the nose." Children in whom the tonsils are thus left, are very liable to a return of the inflammation on catching the slightest cold.

3. Tonsillitis very commonly terminates in suppuration, though not quite so frequently as in adults. After reaching the maximum of intensity, the inflammation seems to subside, but not the swelling; there is less pain, but the mechanical obstacle to deglutition remains; the patient is wearied, exhausted, and almost worn out by suffering and want of food. At length the tissues having been thinned, the abscess points and breaks, and the patient obtains complete relief. Generally the abscess bursts internally, but cases are on record of its opening or being opened externally below the angle of the jaw. The quantity of matter is never considerable, and in some cases we may fail in detecting any, from its being swallowed, and can only satisfy ourselves of its escape by the sudden relief of the distress.

Causes.—The ordinary cause of tonsillitis is cold, and we find the disease most prevalent in low, damp, and cold situations, and at those times and seasons when the weather is most changeable. A second attack of the disease is more easily incurred, and excited by slighter causes than the first. In some children with enlarged and tender ton-

sils I have observed them affected by atmospheric changes without apparently having taken cold.

Diagnosis.—When very severe, the disease has some resemblance to mumps, but in the latter the pain and swelling are chiefly in the parotid gland, and extend from the angle of the jaw to the ear, and there is no inflammation of the tonsils or redness of the neighbouring parts.

Treatment.—If we see the child immediately after the commencement of the attack, it is possible occasionally to cut it short by an emetic, a stimulating gargle, or by strong counter-irritants externally. If these fail, or if we are not called sufficiently early, yet if the attack be mild, it will be easily subdued by gentle antiphlogistic measures. A brisk purgative, followed by sudorifics, fomentations, or poultices; warm pediluvia, with low diet for a few days, will generally afford relief.

When the inflammation is considerable and the fever high, we must have recourse to more decided measures. Topical bleeding, either by leeches to the neck or scarifying the tonsils, will be necessary. The former, I think, are generally preferable, although Kopp speaks of the latter as the most prompt and efficacious remedy we possess. Occasionally, but rarely, it may be advisable to take blood from the arm in older children. After the leeches fall off, or when the bleeding has stopped, the most comfortable application is a light warm poultice frequently renewed. Great relief may also be obtained by inhaling the vapor of warm water, but this should be always done from the mouth of a jug, and never from the spout of a teapot, with children, on account of the danger of closing the lips and drawing up the water.

Internally, after freeing the bowels well, we may give minute doses of tartar emetic, not so as to excite vomiting, unless the viscid mucus be very troublesome, but just so much as to lower the fever and excite the action of the skin. Loeffler and other continental physicians speak very highly of the hydrochlorate of ammonia in tonsillitis. Dr. Condie states that he has derived very great advantage from it. He combines it with ipecacuanha and calomel, so as to give three or four grains of it every three hours.

There are two other remedies generally used, but often without sufficient discrimination, and about which opinions have varied; I mean gargles and blisters. At the very commencement of the attack, stimulating gargles may be useful, but afterwards I quite agree with Dewees that either stimulating or astringent gargles are rather injurious until the decline of the disease. During its height warm water is the best gargle, or if the viscid mucus be very troublesome, we may adopt Eberle's plan of using warm water slightly acidulated with vinegar. When the inflammation and fever are subsiding, we may use either acid or astringent gargles with benefit, or we may try the vapor of vinegar and water as recommended by Hippocrates, or other medicated vapors.

The same rule holds good with regard to blisters. During the increase and height of the disease, soothing applications externally are advisable; liniments, blisters, &c. seem to do harm; but after the acute stage has somewhat passed, much benefit will be derived from stimulating liniments, mustard and meal poultices, or turpentine. I do not like blistering the throat of young children if it can be avoided, as the surface is apt to remain very sore, or perhaps to ulcerate.

When suppuration seems determined upon, we ought to encourage it by poultices, inhalation of aqueous vapor, gargles of warm water, &c. If there be much delay before the abscess opens, and if the patient be much exhausted, or if the swelling should be so great as to interfere with the breathing, it will be better to make an opening with a bistoury, taking great care that no movements of the child give rise to mischief. Dr. Mason Good mentions that in some cases tracheotomy has been found necessary; but such cases must be very rare indeed. The diet should be low until the disease subsides, and then the child must be nourished by broths, jellies, or meat, according to its age and power of swallowing.

Dr. Dewees observes: "As regards the erysipelatous species of the disease, the treatment is somewhat different. We rely more on topical bleeding and the vesicatory applications, and when aphthæ or sloughs appear, on stimulating gargles; and in the event of extreme debility supervening, the system is to be supported by bark, wine, the carbonate of ammonia, and whatever else enters into the treatment of putrid sore throat."*

When the tonsils remain permanently enlarged, we must make some efforts to reduce them, not only on account of the liability to repeated attacks of inflammation, but because they involve a disagreeable change of voice and discomfort in swallowing. Dr. Condie advises the repeated application of nitrate of silver; others, repeated small blisters externally; others, their removal by operation. Professor Hess, of Copenhagen, states that he has employed compression, by means of the index finger applied to the indurated tonsil, with success. This to be repeated three or four times a-day; and when the gland becomes softer, and absorption commences, gargles may be used.† Each of these plans may succeed, and we may try any or all of them, but I would also suggest that the internal application of the caustic tincture of iodine, as well as the external use of the ointment, should have a fair trial previous to any operation. I have seen it very successful in several cases.

As to the removal of the tonsils, I should be strongly opposed to such an operation during childhood, as it is by no means generally successful,

* Diseases of Children, p. 451.

† Ranking's Abstract, vol. ii. p. 192.

and may leave consequences more troublesome than the disease. I do not, therefore, think it necessary to occupy the reader's time by a description of the mode of operating.

As to the prophylactic treatment, it is desirable, of course, that children liable to this affection should avoid all occasions of cold, and on the first sensation of sore throat should be treated with external stimulating applications to the throat, such as mustard poultices, turpentine, compound camphor liniment, &c. and purgatives.

CHAPTER IX.

PAROTITIS. CYNANCHE PAROTIDEA. MUMPS.

THIS is a very common disease, although it rarely attacks very young children, seldom those under five or six years of age, and, according to Dr. West, more frequently boys than girls; but this does not accord with my experience. It consists of inflammation of the parotid gland of one or both sides, occurring together or separately; and during certain seasons it prevails epidemically, as in Dublin and other parts of Ireland a few years ago. Dr. Stewart seems to regard it as one of those diseases which a child must generally have once in its life, but which rarely occurs a second time.

Symptoms.—In the majority of cases the child seems suffering under a feverish cold for a few days before the local symptoms display themselves; it is chilly, uncomfortable, cross, and complains of aching of the limbs, followed by feverish heat of skin, quick pulse, thirst, &c. and then pain is felt about the angle of one or both jaws, and difficulty of opening the mouth to speak or masticate. In other cases we have no preliminary feverishness, but the disease commences at once by pain or swelling at the angle of the jaw. The pain is soon followed by tumefaction behind the angle of the jaw, extending upward to the ear, forward a little on the cheek, and downwards to the maxillary gland, involving the parotid gland and the surrounding cellular tissue. It feels firm, hard, and hot, is painful on pressure, but generally speaking the color of the skin is unchanged; in severe cases it becomes slightly red or pink. Not only is there

irregularity of the two sides of the face thus produced, but I have seen the lower jaw temporarily displaced, and pushed over towards the sound side. There is great pain and difficulty in opening the mouth and in moving the jaw, either to masticate or to swallow, although the dysphagia is evidently not from sore throat. One or both sides of the face may be thus affected, or, after the subsidence of the one, the opposite may succeed to the swelling; and it is from the extraordinary expression of sullenness thus given to the countenance that the name "mumps" has been given to the disease.

If the attack be mild, the fever, swelling, and pain will be moderate, and after a few days will subside without the child having suffered much distress; but in some of the severe cases the suffering is very great; the tumor is very large, hard, and exquisitely tender; the skin covering it of a reddish tinge; the difficulty of opening the mouth so great that the child can scarcely take food, and even when in its mouth, it is almost impossible to swallow it. The fever runs very high, the pulse is full and rapid, and the brain is more or less involved, with delirium, &c., which have occasionally proved fatal according to Dr. Cullen. Moreover, in such cases the swelling extends far beyond the parotid glands, and involves not merely the surrounding cellular tissue, but the submaxillary glands, and the suffering and distress are very great. Such cases are, fortunately, rather uncommon.

A remarkable peculiarity of mumps is the disposition to metastasis. The pain and swelling of the parotid gland will sometimes suddenly subside, and the mammæ in girls, or the testes in boys, become instantly affected with severe pain, swelling, and tenderness. "In the male," says Dr. Dewees, "we once saw the testes prodigiously enlarged; much suffering was endured, and great hazard was incurred by the change. Violent fever and delirium accompanied this change of seat of the disease, and it required a perseverance in very active remedies to subdue them."* The same was observed by MM. Rilliet and Barthez. It has been stated by Dr. Hamilton and others that this metastasis to the testes has been followed by the absorption of the gland, so that the tunica vaginalis became an empty sac. The breasts in female children become very painful, hard, and swollen, but it does not appear that they are liable to wasting away afterwards, nor do they run on to suppuration.

Again, a similar metastasis may take place, and the brain or its membranes become the seat of the secondary attack; and this is more frequent, Dr. Stewart thinks, in those cases where no metastasis to the testes or mammæ takes place. This cerebral metastasis is highly dangerous. The child is attacked by coma or delirium, and may die in a few hours if prompt measures be not taken for its relief.

* Diseases of Children, p. 143.

Two cases of this kind are recorded by Dr. Harvey Luidsly which proved fatal. In one of them there were decided marks of inflammation and congestion of the cerebellum, but none in the cerebrum.*

The *duration* of the disease varies much. In some cases the swelling, pain, and fever reach their maximum in forty-eight hours, and then begin to subside; in others, not till the fourth or fifth day, and some are prolonged to ten or twelve days. The disease is lengthened, also, in those cases in which the two glands are successively attacked.

In by far the majority of cases, the attack terminates in resolution, after the height is reached; the fever and pain subside, the swelling diminishes, and the tenderness gradually disappears. But in some rare cases suppuration takes place, and matter makes its way to the surface.

Causes.—Cold from damp clothing, damp beds, &c. seems to be the principal cause, where the disease is not epidemic. And in damp, marshy situations those attacks seem to be epidemic, and owing to the same cause. But it prevails, also, epidemically and very extensively during damp weather, especially in winter and spring. During the spring of 1849 it was very generally epidemic in Dublin and other parts of Ireland. I heard of one school in which there were twelve, another in which there were sixteen children affected at one time, and there are probably few practitioners of this city who had not abundant opportunity of witnessing different children of the same family attacked together or successively. M. Rilliet has published an account of an epidemic which prevailed at Geneva from March 1848 to May 1849, principally among children between five and fifteen years of age. He believes it to be contagious and analogous to eruptive fevers. An epidemic also occurred in Montpellier in February, March, April, and May, 1848, and has been described by M. Ressiguier.† Whether it really be contagious at the time when it is epidemic, as Dr. Stewart and M. Rilliet and others suppose, is a question not so easy of solution as might be supposed, because, although children of the same family are undoubtedly exposed to the influence of contact, they are also exposed to exactly the same epidemic causes.

Treatment.—The treatment required by simple cases of parotitis is very slight. We may administer an emetic, or a brisk purgative, followed by calomel and antimonials in small doses, with fomentations or poultices to the tumefied jaw, and these may be sufficient.

But when the swelling is considerable, the pain great, and the fever high, it will be necessary to apply leeches to the part affected, and to

* Amer. Med. Journ., April, 1851, p. 542.

† Gaz. Med., 1850. Brit. and For. Rev. October, 1850.

continue the poultices constantly, fomenting the jaw with hot water or decoction of poppy-heads whenever the poultice is renewed. The purgative may be repeated occasionally, and the James's powder, with or without the calomel, continued until the inflammation begins to subside. Pediluvia at bedtime, or an occasional warm bath, will be found very useful.

When the testicles or mammæ are attacked, it will be necessary to apply leeches, fomentations, or poultices, according to the amount of inflammation. When this metastasis takes place, it has been thought advisable by some writers to apply blisters, or irritants of some kind, over the original seat of the mischief, for the purpose of bringing back the inflammation to the parotid gland. Dewees remarks: "We have always blistered the parts immediately over the parotids, and we think with decided advantage." Dr. Condie, however, does not believe that any good can result from this practice, and I am inclined to agree with him; at least I have never found it necessary.

When the brain is attacked, it will be necessary to meet the increased danger very promptly and actively, by the usual means of leeching, cold lotions, blisters, calomel and James's powder, with occasional purgatives, &c.

During the prevalence of mumps in 1849, I saw a disease which might easily have been mistaken for it, but which is, in truth, inflammation of the cellular tissue in the neighbourhood of the parotid, and which often ends in abscess. It has been noticed by Dr. Good as *phlegmone parotidæa*, and by Mr. James as *angina externa*. In the beginning it is very like parotitis; there is pain, soreness, and swelling near the angle of the jaw, but of one side only; great difficulty in opening the mouth; pain in mastication; and febrile excitement; but the tumor is generally below the parotid, more superficial, and the skin is more discolored. In some cases the inflammation is deeper seated and more extensive, the tumor occupying, as Dr. Condie observes, the front of the throat from ear to ear, with oedema of the face occasionally. Suppuration generally takes place; the swelling becomes more prominent at one part, and paler generally; softening occurs; fluctuation is felt; and ultimately the abscess bursts, or is opened, and the tumor gradually disappears. "Instead of a circumscribed inflammation and suppuration, the inflammation is occasionally deep-seated and diffused, and the pus, when it forms, is then liable to extend under the angle of the jaw to the pharynx, or downwards into the upper part of the thorax, producing extensive destruction of the cellular membrane about the neck, and great distress to the patient." When suppuration takes place, the swelling acquires a doughy feel, and an indistinct fluctuation may be perceived at one or more points. The matter is slow in arriving at the surface, and in discharging itself externally. In some instances, distinct, deep-seated collections of matter form, and the pus, mixing with the dead cellular membranè,

becomes putrid, and the evolution of gas thus produced, causes a kind of emphysematous condition of the parts. The febrile symptoms now assume a low typhoid character, the strength of the patient is rapidly exhausted, and death very generally ensues; or, if recovery take place in these extreme cases, an extensive and unsightly cicatrix deforms the patient for life.”*

In cases of the simple phlegmonous inflammation, a few leeches should be applied to the tumor, followed by poultices, fomentations, and a brisk purgative. Dr. Condie recommends a cold lotion after the leech bites have ceased bleeding. The patient must be kept on low diet. Whenever suppuration has taken place, and fluctuation can be detected, the abscess should be freely opened, and poultices continued after the free evacuation of the pus. With a little care, we may generally arrange the opening so that no mark shall be visible afterwards. When the inflammation is diffused, the early stage will demand a similar treatment; but as soon as the swelling acquires a doughy feel, especially if there be difficulty of swallowing, impeded respiration or cough, it will be advisable to make free incisions into the tumor, and then to apply poultices. If the child be much reduced, we must allow better diet, and perhaps, in some cases, wine and bark.

CHAPTER X.

PSEUDO-MEMBRANOUS PHARYNGITIS. DIPHTHERITE. ANGINA PSEUDO-MEMBRANOSA.

IN a former chapter I described simple or erythematous pharyngitis, under the name of *cynanche tonsillaris*, or at least the description of the one may stand for the other, for any difference between them is almost imaginary. Now we have to do with a more serious affection, having much more complicated relations; essentially an inflammation of the mucous membrane of the pharynx, but which is accompanied

* Condie on Diseases of Children, p. 192.

by a secretion of coagulable lymph or false membrane, with or without a breach of the mucous surface.

The disease appears to have prevailed from very early times. Are-tæus mentions it as a complication of croup; P. Forest observed an epidemic at Alkmar, in Holland; it appeared in Spain in the seventeenth century; at Naples in 1618; and about 1636, at Kingston, in America. A similar epidemic prevailed in Paris, from 1743 to 1748, and has been described by MM. Malouin and Chomel; in England about the same time, and at Cremona. I cannot agree, however, with Rilliet and Barthez, that the "putrid sore throat" of Dr. Fothergill was diphtherite; but rather gangrenous pharyngitis. We are mainly indebted for our knowledge of the disease to the labors of Dr. S. Bard, of New York,* M. Bretonneau of Tours, M. Deslandes, and Rilliet and Barthez.

But it is not merely as an idiopathic or *primary* disease that this diphtheritic affection is to be considered; it forms a very important complication of several diseases, particularly the eruptive fevers. We must, therefore, examine into its characteristics, both when *primary* and when *secondary*.

Symptoms.—*Primary pseudo-membranous pharyngitis* may commence very mildly, not unlike common sore throat, with a slight febrile excitement, or without any, the appetite and strength being but little deranged. Or in some cases the fever may be more intense, with general uneasiness, aching of the limbs, thirst, &c.; and shortly afterwards the child will complain of soreness of the throat, increased by swallowing, especially if the bulk be small. In the majority of M. Bretonneau's and Rilliet and Barthez's cases there was but little fever, but in a few cases (four altogether) the fever was intense. The epidemic character may also modify this peculiarity; thus, in the one described by Dr. Bard and M. Ferrand,† there was no fever, but in the observations of M. L'Espine‡ it was intense.

Pain in the pharynx is rarely severe; it is felt at the beginning chiefly, but it does not go on increasing; sometimes it is absent altogether, and I may say the same of the distress in swallowing. I have seen it very considerable, with a sense of heat and local soreness, and I have also found it entirely wanting. This is the experience of M. Bretonneau.§ The voice is commonly obscure and nasal, but not hoarse or whispering, unless the disease extend into the larynx, in which case the symptoms will be those of croup, already described. Cough sometimes exists, but it usually resembles in sound that pro-

* Trans. of American Philosophical Society, vol. i.

† Thesis, 1827, p. 8.

‡ Archives Gén. de Méd., 1830, vol. xxiii. p. 521.

§ De la Diphtherite, p. 113, &c.

duced by the action of hawking rather than a common cough, and is altogether different from the tone of the cough of laryngitis.

For a short time after the commencement of the disease, if we examine the throat, we shall merely discover some redness and swelling of the tonsils, but we shall shortly perceive patches of coagulable lymph here and there on these organs, of a white or yellowish-white color, more rarely gray, with thin edges, and which, coalescing, cover the tonsils, palatine vault, and pharynx, with this lardaceous false membrane. Not only does it spread gradually over the neighbouring parts, but it also increases in thickness, until the parts affected seem as if covered with curd, not evenly, as if by a continuous membrane, but by patches, some large and some small, giving to the surface a *lichenoid* appearance, as M. Bretonneau justly describes it. Occasionally they present the aspect of a deep ulcer or fissure. More or less they will be found to cover the uvula, the tonsils, and the pharynx. Sometimes in the latter situation the layer is semi-transparent, or it may be covered with mucus, either of which circumstances may at first deceive us as to the existence of the false membrane. After the lapse of a few days, the false membrane begins to detach itself, not regularly, but here and there, leaving the mucous surface smooth and bright red; or it may become gradually thinner, until it entirely disappears, and then, in many cases, it is renewed more or less completely, and is again thrown off, until the disease is cured. Rilliet and Barthez state that in twenty-one cases, the false membrane occupied the tonsils only in six; the tonsils and some part of the velum palati, in four; the tonsils, the vault of the palate, and the pharynx, in six; the tonsils and the pharynx, in five.

The false membranes, and the parts covered by them, sometimes present a much more alarming aspect than the one just described. They appear as gray, reddish, or blackish shreds, attached to the tonsils or palatine vault; the soft parts of the fauces appear sphacelated; the vault of the palate, the tonsils, and the mucous membrane of the pharynx seem detached in part, and there are gray patches, with violet-colored edges, resembling gangrenous eschars. The breath becomes very foetid, and there is profuse salivation. This form is rare, and resembles the putrid sore throat of Fothergill and others, in many points.

Four or five days after the appearance of the false membranes, we find the submaxillary glands become painful, swollen, and tender, especially on that side on which the inflammation is most intense. The cellular tissue of the neck may also become affected, and the neck increase in volume considerably; but this seems to be more owing to infiltration of serum than to inflammation. When the progress of the disease is favorable, the false membranes are thrown off, and not reproduced; the swelling of the submaxillary gland subsides, the redness of the mucous membrane disappears, and in eight or ten days the disease

is cured. Cases may, however, terminate unfavorably by the extension of the false membranes to the air-passages, giving rise to croup, &c., or the disease may assume a typhoid type, but whether from the poisoning caused by the absorption of the putric secretions, as supposed by M. Bourgeois,* or not, may be doubted.

When the attack is severe, there is considerable fever, with heat of skin, quick pulse, difficulty and pain in swallowing; if the disease extend upward into the posterior nares, the child cannot breathe through the nostrils; and if into the Eustachian tube, the hearing will be imperfect, or perhaps complete deafness may be produced.

So far, then, we find primary diphtheritis to be characterized by a few and unimportant general symptoms in the majority of cases; by a certain amount of fever, loss of appetite, soreness of throat, and pain in swallowing, in others; and in all, by inflammation of the mucous membrane of the pharynx and neighbouring parts, with a deposition of coagulable lymph, or curdy false membrane.

Secondary diphtheritis exhibits the following modification of these symptoms, according to Rilliet and Barthez: 1. It commences by vivid and general redness and swelling of the palato-pharyngeal mucous membrane. 2. After an uncertain time, there appear upon the tonsils small whitish or yellow patches, in general thin, superficial, and easily detached; most frequently limited to the tonsils, occasionally involving the uvula and palate, and more rarely the pharynx. According to authors, we find that the false membranes of secondary pharyngitis, and particularly in scarlatina, may assume a gangrenous appearance, having a strong resemblance to some already noticed. 3. The swelling of the submaxillary gland is the same. 4. The pain often more intense than in the primary form, exhibits the same characteristics. 5. The fever, always more intense, most generally is dependent upon the original disease.†

Morbid Anatomy.—According to Bretonneau, the false membranes may sometimes be found on the first day of the disease, generally somewhat later. They first appear as whitish or yellowish patches on the tonsils, circumscribed and resembling flakes of curd; increasing in number and extent, they coalesce more or less completely. They adhere sufficiently firmly to the mucous membrane, vary in thickness, and increase by additional layers. Occasionally they are mixed with blood, and acquire a gray or brown color, which has led to the supposition of their being gangrenous. They are in direct contact with the mucous membrane, and are not covered by epithelium, according to Bretonneau, Rilliet and Barthez. The mucous membrane beneath the deposition is more or less injected and red, and often presents spots

* Journal Gén. de Méd., vol. cix. p. 441.

† Mal. des Enfants, vol. i. p. 295.

of ecchymosis. Rilliet and Barthez and Guersent conceive that in some cases there is loss of substance from ulceration; such cases, however, are very rare. The submaxillary glands are enlarged, but rarely suppurate; their tissue is tender, homogeneous, and of a whitish-red color at an early period, and resembling the structure of the kidney at a more advanced stage.

In *secondary* diphtheritis, we find the mucous membrane of a bright red, rough and unequal, much thickened and softened; the tonsils enlarged, soft, and irregular; not unfrequently, also, we find a breach of surface: ulcerations of various forms extend in different directions, deep or superficial, with level or raised edges, and healthy or unhealthy surfaces. False membranes may be generally observed at different points; seldom over the entire fauces. They are generally thin, soft, and fragile, of a whitish, grayish, or yellowish color, mixed with purulent matter. Sometimes the false membranes occupy the superior or inferior part of the pharynx, the intermediate portion being intensely inflamed, and covered with purulent matter. The submaxillary glands are enlarged, red, and soft.

Considerable difference of opinion prevails as to the pathological character of the disease. Bretonneau, Guersent, and others, maintain that it is a specific inflammation; Broussais and Ermangard, that it is a gastro-enteritis; Joly, that it is a hemorrhagic inflammation, in which colorless fibrine is exuded upon the inflamed surface; Naumann attributes it to a change in the condition of the blood, in consequence of which the albuminous portion is separated and exuded; and Andral regards the disease as hyperæmia of the fauces, with exudation of coagulable lymph. The latter is, no doubt, a true expression of the fact; but neither that nor any of these opinions deserve the character of an explanation of the nature of the disease. For fuller details, I must refer the reader to M. Bretonneau's elaborate work.*

Complications.—These are of two kinds, those which consist of an extension of the same disease, and those which result from the general condition of the patient.

1. The secretion of false membranes may not be limited to the pharynx, but may extend itself to the nasal apertures, or into the larynx, trachea, and bronchi. This coincidence and succession is very remarkable in some epidemics. M. Bretonneau states that the angina or coryza appears first, then the laryngitis, then bronchitis. It is very rare that this order is reversed, and still more rarely does the disease appear in different parts simultaneously. It is especially in an epidemic that these complications occur. I am not prepared to speak positively as to the extension of the diphtherite to the stomach and

* Des Inflam. speciales du tissu muqueux et en particulier de la Diphtherite, &c., pp. 240, *et seq.*

intestinal canal, but I confess I think it extremely probable; for we find shreds of what looks like the false membrane voided by stool in cases of this disease; and most, I suppose, have seen the diphtheritic deposit around the anus.

2. The disease may also attack remote parts of the body, particularly parts covered by mucous membrane, or from which the cuticle has been removed by a blister, according to M. Trousseau. Thus, the pseudo-membranous secretion may be observed upon the lips, *alæ nasi*, the concha, the external meatus behind the ear, in the groin, on the nipples, &c.

3. Another class of complications, dependent upon some peculiar state of the constitution, consists of hemorrhages, which, however, are absent in some epidemics, though very common in others. For instance, Bretonneau makes no mention of it, whilst Bourgeois and Lespine found it a common occurrence, either from the nose, from the mucous membrane, or from the skin, and to such an extent as to occasion death.

4. M. Bretonneau relates a case of the present disorder complicated by gangrene of the pharynx.

5. M. Guersent has remarked that from the third to the seventh day the patient may be attacked by broncho-pneumonia or catarrhal pneumonia, which at its commencement is very insidious, and apt to be masked by the symptoms of the angina.

These are the chief complications. Other diseases, as enteritis erysipelas, or the eruptive fevers, may occur, but they can only be regarded as coincidences.

Causes.—That the same causes which give rise to simple pharyngitis may be influential in causing the present disease one can hardly doubt; but it seems in general that something additional is requisite for its production. The crowding together of children in a close habitation may give rise to it, as was observed at St. Denis, by M. Bourgeois.

Most frequently, however, the disease prevails as an epidemic, and those cases which would otherwise be simple pharyngitis take on this character, and exhibit the curdy deposition. Besides the epidemics which I have mentioned at the beginning of this chapter, M. Bretonneau mentions their prevalence at Tours in 1818 and subsequent years; M. Girouard, at Sancheville, in 1824; M. Ferrand, in 1825, at La Chapelle-Veronge; M. Guimier, at Vouvray, in 1826; M. Bourgeois, at the establishment of the Legion of Honor at St. Denis, in 1827-8; M. Trousseau, at Sologne, in 1828; M. Baud, in the Canton de Vaud; M. L'Espine, in the Royal Military School of La Fleche, in the same year; and in the State of Ohio, by Dr. Welsh, in 1847, 1848-9.*

* American Journ. of Med. Science, July, 1850, p. 276.

Some difference of opinion prevails as to whether the disease is contagious. From the facts collected by M. Guersent, from his own experience and that of others, he has come to the conclusion that it is, and in this opinion Rilliet and Barthez concur.

In its secondary form, the disease may occur in the course of scarlatina, typhus fever, measles, remittent fever, &c., adding much to the distress of the patient, and sometimes to the danger of the primary affection.

Diagnosis.—1. The presence of the false membrane will distinguish diphtherite from simple or erythematous pharyngitis, although, on the first day of the attack, the aspect of the parts may be precisely the same.

2. The peculiar characters of gangrene of the pharynx are equally well marked, and so different from diphtherite that there is little danger of our confounding them; the gangrenous eschar and odour, the loss of substance, and the absence of false membrane on the neighbouring parts, are very characteristic, not to mention the difference in the symptoms and history of the two cases. Moreover, gangrene generally attacks children previously debilitated by disease, whereas primary diphtherite may occur in children who, up to that time, have been perfectly healthy. No doubt the two diseases may attack the same child, but it is certainly a coincidence only.

Prognosis.—The prognosis of the disease will depend very much upon the extent of the disease, its complications, the state of the child's constitution, and the character of the epidemic. If the attack be limited to the pharynx, and occur sporadically, it is generally easily cured, according to MM. Bretonneau, Guimier, and others; although in one such case related by Bretonneau, and another by Rilliet and Barthez, death took place.

When the false membranes extend into the larynx and trachea, we shall have croup with all its danger; and when the skin takes on an inflammatory action, with or without false membrane, as in the epidemic described by M. Trousseau, death may occur from exhaustion. A like result may follow in those cases in which the disease appears at the opposite extremity of the mucous membrane, the vulva, or anus.

In secondary diphtherite, the danger will probably depend more upon the primary disease, although, doubtless, the secondary affection will increase it.

Treatment.—The indications of cure are not quite so simple as in the previous affections. Much will depend upon the extent of the disease, its disposition to penetrate into the larynx and the trachea, constitution of the child, and upon the character of the epidemic when the disease prevails extensively. Most writers, also, dwell upon the greater importance of topical applications.

The principal caustic applications which have been employed are

muriatic acid, nitrate of silver, powdered alum, and the chloride of lime; and they are said to act both by preventing an extension of the false membrane, and also by changing the character of the inflammation. M. Bretonneau used the first of these applications; and he recommends two thorough cauterizations, at an interval of twenty-four hours, afterwards milder applications. M. Guersent substituted the nitrate of silver for the muriatic acid; but in using this we must take care that the stick is not broken and swallowed. The chloride of lime, calomel, or alum, can easily be applied to the diseased surface, either by the finger or by a small roll of lint. Some one of these remedies should be applied as soon as the distinctive characters of the disease appear, or as soon as the patient is placed under our care, and repeated as often as we may find necessary, judging from the change produced by it. If the case be a slight one, occurring sporadically, and the child in good health otherwise, an emetic may be at once administered, the bowels properly freed, and the throat painted with a solution of nitrate of silver every day or every second day; which will probably be sufficient to cure the disease. But if the case be more severe, the inflammation and swelling greater, and the child of a robust constitution, it will be well to commence with the application of a few leeches to the throat, followed by poultices. Broussais, Ermangard, and others, have ordered the application of leeches to the epigastrium; but unless there were decided tenderness in that region, I do not think it would be necessary; and in no case should blood be abstracted when there are symptoms of depression or exhaustion. After the application of leeches, the case must be treated by caustics, purgatives, and perhaps by an emetic. In the intervals of cauterization, the vapor of hot water may be inhaled three or four times a day, or a slightly acidulated gargle used equally often.

Internally, small doses of calomel will be found useful, either alone or in combination with ipecacuanha. Emollient drinks, iced water, lemonade, or acidulated water, should be allowed, and an occasional warm bath or pediluvium will greatly add to the comfort of the patient.

There is much difference of opinion as to the propriety of blistering the throat, and I confess that I agree with those who object to it as a rule. I do not deny that there are some cases which appear benefited by it, but in general I should much prefer simple poultices, or, if we wish to excite irritation, poultices of mustard and linseed meal, or a liniment sufficiently strong to redden the skin.

If the disease be epidemic, but not exhibiting a typhoid character, the treatment will be nearly the same; a little more caution in applying leeches, the prompt use of caustics, and their repetition each day until the surface exhibits an altered appearance, the exhibition of calomel, mild purgatives, emollient or acidulated drinks, &c. will be equally necessary. But if the epidemic show a typhoid character, we

must make a considerable change from the above plan. The parts must be cauterized, and the bowels kept free, but we must carefully abstain from bleeding, and from everything calculated to lower the system. For this form of the disease, a very useful gargle may be made with decoction of bark and nitric acid, from twenty to fifty drops of the latter to half a point of the former. And in addition to this, we must administer bark, or ammonia, or both, internally, with a liberal use of wine, according to the circumstances of the child. Wendt advises enemata of decoction of bark, and Rilliet and Barthez concur with him.

The diet must be regulated according to the character of the attack: if there be much fever and acute inflammation, it should be mild and spare; but when typhoid symptoms are present, the strength must be supported by beef-tea, broths, &c.

CHAPTER XI.

PUTRID SORE THROAT. GANGRENOUS ULCERATION OF THE PHARYNX.

THERE exists considerable confusion among writers as to this disease; some having described under this name an aggravated form of diphtheritic sore throat, attended by dark-colored crusts, bad smell, &c.; and others on the opposite side having nearly denied the existence of such a disease. M. Bretonneau, I think, has proved that the *angina maligna* of many writers was a modification of diphtherite, but the observations of M. Becquerel, MM. Rilliet and Barthez, and others, leave no doubt of the occasional occurrence of gangrenous ulceration; and, notwithstanding the opinion of the last-named writers, to which great respect is due, I cannot but believe that the "putrid sore throat" described by Dr. Fothergill, of London, was really this disease.* He states that the disease was first noticed in London, and that it re-

* First published in 1748, and now included among his collected works, p. 167.

appeared in 1742. Again, in the winter of 1746, "so many children died at Bromley, near Bow, in Middlesex, of a disease that seemed to yield to no remedies or applications, that several of the inhabitants were greatly alarmed by it, some losing the greater part of their children after a few days' indisposition. Some others of the neighbouring places were affected at the same time with the like disease, which, from all the accounts I have met with from those who attended the sick was that here treated of. I am informed likewise that it raged at Greenwich at the same time."

Gangrenous ulceration may attack the throat as a primary disease in children hitherto healthy, as in a case lately under my care; but it much more commonly supervenes in the course of other diseases; or ulceration of the mouth, previously existing, whether simple or aphthous, may assume a gangrenous character and appearance.

Symptoms.—The disease may commence like a common sore throat with some degree of fever, rigors, heat of skin, quick pulse, weariness, &c., but without exciting any alarm; and the patient may then complain of soreness of the throat, pain and difficulty of swallowing, &c. On examination we find at first the pharynx and tonsils swollen, and of a dusky red, with perhaps a spot of commencing ulceration, which enlarges daily, and shortly presents its peculiar characters. Or, as in Dr. Fothergill's cases, it may come on "with such a giddiness of the head as commonly precedes fainting, and a chilliness or shivering like that of an ague fit; and these interchangeably succeed each other during some hours, till at length the heat becomes constant and intense. The patient then complains of an acute pain in the head, of heat and soreness rather than pain in the throat, stiffness of the neck, commonly of great sickness, with vomiting or purging, or both. The face soon after looks red and swelled, the eyes inflamed and watery, as in the measles, with restlessness, anxiety, and faintness. The disease frequently seizes the patient in the forepart of the day. As night approaches, the heat and restlessness increase, and continue till towards morning, when, after a short, disturbed slumber (the only repose they often have during several nights), a sweat breaks out, which mitigates the heat and restlessness, and gives the disease sometimes the appearance of an intermittent. If the mouth and throat be examined soon after the first attack, the uvula and tonsils appear swelled, and these parts, together with the velum pendulum palati, the cheeks on each side, near the entrance into the fauces, and as much of them and the pharynx behind as can be seen appear of a florid red color. This color is commonly most observable on the posterior edge of the palate, in the angles above the tonsils, and upon the tonsils themselves. Instead of this redness, a broad spot or patch, of an irregular figure and of a pale white color, is sometimes to be seen, surrounded with a florid red, which whiteness commonly appears like that of the gums immediately after having been pressed with the finger, or as if matter

ready to be discharged were contained underneath." "The appearance in the fauces continues to be the same, except that the white places become more ash-colored; and it is now discernible that what at first might have been taken for the superficial covering of a suppurated tumor, is really a slough concealing an ulcer of the same dimensions." Dr. Fothergill mentions other symptoms worthy of notice. The first is an erythematous eruption on the face, neck, hands, and breast, with some tumefaction, and occurring generally on the second day. Another phenomenon is a swollen, hard, and painful condition of the parotid glands on each side; and if the disease be violent, the neck and throat are surrounded with a large œdematous tumor, sometimes extending itself to the breast, and, by straightening the fauces, increasing the danger. Delirium was a frequent symptom in those cases; occurring at first at night, bearing a direct relation to the feverish exacerbations, and gradually relieved by the perspiration which broke out towards morning. The pulse was very quick for some days, but although the uvula and tonsils were much inflamed, the difficulty of swallowing was less than might have been expected. The offensive putrid smell was not only evident to those around, but even to the patient himself. In severe cases the disease extended to the inside of the nostrils, which was of a deep red or livid color, and a putrid sanies was discharged, so corrosive as to excoriate the parts over which it flowed. The lips also, and the margin of the anus, occasionally exhibited the same appearance. Dr. Fothergill thinks it probable that the diarrhœa may be owing to this discharge being swallowed. Hemorrhages from the nose, mouth, and ears sometimes occurred; in general to a moderate amount, but in some cases proving suddenly fatal. They seemed to result from the injury of some arterial branch by the ulceration. The duration of this disease was variable. Some seemed to mend after the second day; others continued three, four, or six days, even when favorable, and the decline of the disease was marked by the disappearance of the eruption, the subsidence of the pulse and fever, and the throwing off of the sloughs, and the more healthy appearance of the ulcers. In unfavorable cases the diarrhœa persists; "they generally spit very little; the fauces appear dry, glossy, and livid; the external tumor grows large; they void their excrements without perceiving it, and fall into profuse sweats; respiration becomes difficult and laborious; the pulse sinks; the extreme parts grow cold; and death in a few hours closes the scene."*

If, as appears to me, this disease were really gangrene, it was the primary form, and differed very widely in the acute character of its symptoms from the secondary form described by Becquerel, Guersent, Rilliet and Barthez, &c. In the latter, the chief general symptoms

* Works, pp. 220-225.

resulted from the primary malady, whatever that might be, but the occurrence of the gangrene was chiefly marked by a profound alteration of the countenance, great depression, and the small, quick pulse. Loss of appetite, thirst, and diarrhoea also existed, but they may have been the result of the original disease as well as of the gangrene. The local symptoms were often obscure and sometimes uncertain. The fœtid odour of the mouth was invariable, and of great value in those cases where the ulcer could not be seen, either from its situation or the difficulty of opening the mouth.

In none of Rilliet and Barthez's cases did the patient suffer any pain, and deglutition was easily effected, and not marked by the regurgitation of liquids through the nose. In one case, where the gangrene was considerable, the patient drank and eat solid food until the day of her death. M. Guilbourt mentions that one of his patients suffered severe pain and difficulty of swallowing; and in a case of M. Constant's the patient incessantly put his finger into his mouth, as if to remove something that annoyed him. The swelling of the submaxillary glands, and of the cellular tissue, was not remarked except in one case, nor the abundant, fœtid, sanious salivation.

As we might expect, the course of so serious a disease supervening upon another complaint, and in constitutions so enfeebled, is very rapid; sometimes, two three or four days terminate life, and the case rarely passes the sixth.

Complications.—Of course, in secondary gangrene, some of the concomitant diseases which have been noticed were merely coincidences; nevertheless certain of the complications appear to be either an extension of the disease, or closely connected with it.

1. The gangrene may extend gradually to the neighbouring parts, the nares, the mouth, the œsophagus, or the larynx.

2. Even distant organs may exhibit a similar morbid action; thus the uvula externally, or the lungs internally, have been attacked by gangrene during the course of gangrene of the pharynx.

3. M. Guibourt mentions a case in which œdema of the glottis occurred.

4. Pneumonia may occur, but it is less frequent than in gangrene of the mouth.

5. In nine out of twelve cases there were tubercles in the lungs, but this we must regard merely as a coincidence.

6. I have already alluded to the occurrence of fatal hemorrhage in Dr. Fothergill's cases. I have seen the child seriously weakened by it, though not destroyed; but Dr. Mills has related two cases in which death occurred suddenly from this cause.*

Morbid Anatomy.—At the commencement of primary gangrene we find the mucous membrane of a florid or deep red color, with a white

* Edin. Med. and Surg. Journal, Jan. 1844.

or ash-colored spot, according to Dr. Fothergill, or with an unhealthy looking ulcer at a somewhat later period. This ulcer may occupy one or both tonsils, the back of the pharynx, the posterior nares, or the commencement of the œsophagus; and as the disease advances we shall probably find it extending on either side: I have seen the uvula, velum, and soft palate entirely destroyed by it. The surface, at first grayish or ash-colored, gradually becomes dark brown. Dr. Fothergill observes: "When the disease is of the mildest kind, a superficial ulceration only is observable, which may casually escape the notice of a person unacquainted with it. A thin, pale, white slough seems to accompany the next degree; a thick, opaque, or ash-colored one is a further advance; and if the parts have a livid or black aspect the case is still worse. These sloughs are not formed of any foreign matter spread upon the parts affected as a crust or coat, but are real mortifications of the substance, since, whenever they come off or are separated from the parts they cover, they leave an ulcer of greater or less depth, as the sloughs were superficial or penetrating."* A dark reddish-brown hue may be given to the slough by the oozing of blood, but the brown color may exist independently. The odour is fœtid, overpowering, perceived even by the patient, and rendering the room intolerable. Portions of the slough may be cast off, but it is rapidly reformed; the surface underneath has generally an unhealthy appearance.

The secondary gangrene described by the French writers I have named may be either circumscribed or diffused.

1. *Circumscribed Gangrene* generally occupies the lower portion of this canal, near its junction with the œsophagus, either on its posterior or anterior surface, and consequently it is not within view during life, and we are mainly left to infer it from the putrid smell, and the accession of the symptoms I have mentioned. The gangrenous spots are sometimes oval, sometimes round, varying in size from a pea to a shilling, and it is very probable that the larger are formed by the coalescing of several smaller ones. The surface of these patches is depressed, gray, blackish, or quite black, the edges clear cut and yellow, and with the characteristic gangrenous smell. Beneath the slough the mucous membrane and subjacent tissue are destroyed, and so deeply, in some cases, that the muscles are clearly exposed. The surrounding mucous membrane appears unchanged, neither red, nor thickened, nor softened. When the slough is thrown off we find an ulcer with more or less loss of substance, and which is occasionally covered afterwards by a layer of false membrane. However limited and superficial the gangrene may be at first, it may ultimately penetrate into the larynx or extend to the epiglottis; or it may be confined to one or other tonsil.

2. *Diffused Gangrene*.—This form differs widely from the former; the eschars are quite irregular, and may occupy the entire vault of

* Works, p. 237.

the palate, the velum, tonsils, and pharynx. The limit between the diseased and healthy tissues is not clearly defined, although the edges are sometimes formed by the detached epithelium. Sometimes the gangrene is superficial, and though extensive, scarcely penetrates below the mucous membrane. The surface is unequal, of a grayish black, easily removed by the scalpel, and of unequal thickness. The sub-mucous tissue is of a violet color; but when the deeper tissues are affected they become of a black color, and present the appearance of a mass of detritus. The form is generally of considerable extent, and spreads to all the neighbouring parts, so that the palate, the cheeks, the gums, or on the other hand, the epiglottis, and larynx, may be attacked. Diffused gangrene is rather more common than the circumscribed form. Of thirteen cases, eight had diffused gangrene, and in seven it occupied the velum palati, the tonsils, and a great part of the pharynx.*

Causes.—Dr. Fothergill found the disease most frequent from September to December, but the peculiar condition of the weather seems to have little or no influence. It more frequently attacks children than adults, and children under six years rather than over, according to Rilliet and Barthez. Dr. Fothergill states that more girls than boys suffer from it; but out of Rilliet and Barthez's thirteen cases, seven were boys and six girls.

All are agreed that children of feeble constitutions, or whose health has been destroyed by previous disease, are very much more exposed to it; and there are certain diseases whose course it complicates as a secondary affection. These are the eruptive fevers, measles, scarlatina, or smallpox, and likewise pneumonia, peritonitis, diphtheritis, and typhus fever. I have already mentioned that the milder forms of ulceration of the mouth and throat do occasionally assume a gangrenous character, probably owing to the peculiar state of constitution induced by previous disease.

It is said to prevail epidemically, but we have no very well authenticated information upon the subject. M. Becquerel, indeed, has observed a kind of epidemic in the Hôpital des Enfants, and has recorded his observations. Some writers seem to consider it contagious. Dr. Fothergill remarks that when one child of a family has it, all the rest take it if they are not kept apart; but I should be very much inclined to doubt its being directly communicated from one person to another.

Diagnosis.—In cases where the gangrene is primary, there is not much difficulty in recognising it; the ash-colored, brown, or black slough, the gangrenous smell, and loss of substance, would alone be sufficiently characteristic; but in Dr. Fothergill's cases, there was

* Rilliet and Barthez, *Mal. des Enfants*, vol. ii. p. 169, *et seq.*

œdema of the neck, and rapid sinking in the more serious cases, which were different from other affections of the throat.

In secondary gangrene, when circumscribed, and situated low down in the pharynx, the diagnosis may be very difficult; and I need not say that the age of the patient, and the difficulty of minutely investigating the throat, will increase the chances of our overlooking or confounding the disease. In such cases the fœtid odour will be very important; but as that may arise from gangrene of the mouth or lungs, we can only fix upon the larynx as its seat by finding those other parts free from disease. It is true, as Rilliet and Barthez observe, that it will not signify if we do mistake as to this point; but it is very important that we should not mistake diphtherite for gangrene, to which, in some cases, it bears a strong resemblance, the odour being occasionally fœtid, and the sloughs dark-colored. If we have watched the case from its commencement, we shall not be likely to make this mistake; but if not, or if we should still be doubtful, the application of caustic, by changing the vitality of the parts, and effecting the separation of the apparent sloughs, will show, in cases of diphtherite, that the mucous membrane has not really been destroyed.

Prognosis.—The disease is very serious, nay, very fatal. A great proportion of cases of primary gangrene die, and a still larger number of secondary cases. The profound destruction of parts, the disposition to spread, the unhealthy condition of the patient, added to the injury inflicted by the primary disease, render recovery very hopeless.

Treatment.—The result of Dr. Fothergill's experience was that, however acute the symptoms might be, the patient was never relieved by bleeding. He gave a mild emetic, occasionally following it by warm, aromatic, and stimulating medicines, wine, broths, &c. Locally, he recommends gently stimulating gargles; in mild cases, a stronger one; with the *mel Egyptiacum* in more severe ones. Means are also to be taken to arrest the diarrhœa and hemorrhage, if present.

Rilliet and Barthez recommend an attempt to limit the extent of the gangrene by muriatic acid or the application of the chloride of lime to the parts affected. An occasional emetic may favor the separation of the eschar, and may prevent the injurious effects of the putrid detritus which may have been swallowed. Gargles of decoction of bark, with nitric acid, are useful; but if the child be too young to gargle, they may be injected with a syringe. Internally, the constitution must be invigorated by a liberal allowance of bark (syrup of quinine is a pleasant form for children), ammonia, wine, broths, &c.

CHAPTER XII.

ABSCESS BETWEEN THE PHARYNX AND THE SPINE.

BEFORE passing to the consideration of the diseases of the stomach, I feel it right to notice the disease so well described by my friend, Dr. Fleming, in his interesting paper,* both on account of the alarming symptoms to which it gives rise, its simple method of cure, and because I am not aware that it has been noticed by any author before Dr. Fleming, as occurring during infantile life.

The disease in question is an abscess formed behind the pharynx, and between it and the spine; and, when acute, it appears to consist in inflammation and suppuration of the loose cellular tissue in this situation, and occasionally of a lymphatic gland, not unfrequently to be found here; when chronic, it partakes of the nature of scrofulous abscesses. It may occur at all periods of life, from infancy to manhood. Dr. O'Farrell has recorded a case of this affection at the age of four months, which Dr. Fleming witnessed in consultation with him.†

Symptoms.—The symptoms are very characteristic, although at first one might attribute it to some affection of the nervous system. They may be divided into the premonitory and the essential. “The *premonitory* indication of *local* uneasiness, but yet common to all affections of the throat, complained of or otherwise, according to the age of the child, and, on examination, not accompanied with proportionate visible lesion. The *essential*, often very suddenly supervening, and indicated by derangement of the cerebral, circulating, and respiratory systems, alternating with the comparatively healthy condition of those systems, according to the alteration in the position of the individual; fixed and retracted state of the head, with rigidity of the muscles at the back of the neck, and more or less locked state of the jaws; painful deglutition, impossibility of swallowing, solids and fluids convulsively darted forward through the mouth and nose; repeated acts of deglutition, without the presence of any fluid in the mouth, and, on examination of the fauces, a firm projecting tumor felt beyond the base of the tongue, and, if seen, presenting a smooth, rounded, highly vascular appearance behind the soft palate, usually occupying the median line, but occasionally inclining to either

* Dublin Medical Journal, vol. xvii. p. 41.

† Dublin Hospital Gazette, 1845, March 1, p. 20.

side. These essential symptoms, accompanied with the ordinary characteristics of suppurative fever." "Fever, more or less sthenic in its character, according to the peculiarity of constitution of the child, is always present, and, I think, precedes the development of the local symptoms."

As regards the *chronic* abscesses, the "symptoms attendant upon them are in a much milder degree of the same character with the acute; and perhaps the more prominent are the remarkable effects produced on the respiration by change to the recumbent posture. There is absence of fever, and throughout the day the child is free from any obvious illness, able to play, and join in the amusements of other children. I have known them not to complain of any uneasiness in the throat, and attention to be directed to it from the raucous breathing during sleep. In fact, the symptoms much resemble those of common scrofulous induration of the tonsil. They are, hence, cases of comparatively minor importance; there is time to investigate them. Indeed, with them may be complicated chronic enlargement of the tonsils. I have met with them after scarlatina, after variola, and after measles. In fact, they are some of the sequelæ of those cutaneous diseases, and, like them, may be accompanied with suppuration of the internal or external ear, and so come under the description of similar cases already alluded to as described by Petit."

Diagnosis.—When the tumor is large, and the cerebral symptoms intense, the case may not unlikely be set down as one of disease of the brain; or, at an earlier period, it may be mistaken for disease of the cervical portion of the spine. In all such cases, a careful examination of the throat should be made, as the presence of the tumor will remove such doubts at once. Moreover, the difficult deglutition, the regurgitation of fluids through the nose, &c., point decidedly to some mechanical obstruction, and an examination will at once prove that it is not from enlarged tonsils, but from a firm projecting tumor beyond the base of the tongue, and generally in the centre of the pharynx.

Treatment.—Dr. Fleming's experience has proved that surgical interference is as effectual as it appears to be essential from the symptoms; and not alone from the fact of certain fatal results from mechanical pressure on, and interference with, vital organs, but also from the situation of the abscess being particularly favorable to extensive diffusion. In one case only has Dr. Fleming seen a spontaneous opening occur; the abscess was situated high up, and the matter passed through the nose.

For increasing the facility of the operation, Dr. Fleming has contrived an instrument consisting of a trocar about four inches long, one extremity of the canula being slightly curved, the other with a ring on its upper surface to receive the forefinger; into this canula was passed a jointed stiletto, with, at its opposite extremity, a ring for the thumb, and a moveable screw, to graduate the projection of its point.

The greatest caution must be observed. An assistant must hold the

head firmly, and be ready to throw it forward when the puncture is made. The operator should pass his left forefinger to the back of the pharynx, and, fixing the point of it upon the tumor, use it as a guide to the trocar, so as to place it on the most prominent part of the tumor, when pressure on the stiletto will effect the object in a moment.

Dr. O'Ferrall recommends that the operator should stand behind the patient, and pass the forefinger of his left hand between the palate and the tongue, carefully avoiding the latter, until it reach the abscess. The trocar is thus readily guided to the point intended to be punctured, and thus all danger to the surrounding parts is avoided. Dr. O'Ferrall, in similar cases, would in future prefer a straight bistoury, having the cutting part short, as the density of the covering of such abscesses renders the plunge of a trocar unsafe. For fuller details, illustrated by very interesting cases, I must refer my readers to Dr. Fleming's excellent paper.

CHAPTER XIII.

DISEASES OF THE STOMACH.

BEFORE proceeding to describe the different affections of the stomach and intestinal canal, I shall avail myself of the researches of Billard and Rilliet and Barthez, to lay before my readers the condition of the mucous membrane of this canal in health, as it is quite possible for an un instructed person to mistake some of these appearances for the result of disease. Billard remarks: "Now, from the examination of the stomach in several embryos and fœtuses, it appears that the internal surface of this organ is of a light red color, more or less marked; that the internal membrane soon shows the existence of villi; that they are more evident than in adults; and that this internal membrane, towards the fourth or fifth month, less adherent than the other membranes, may be separated from them with great ease. Meckel observes that it is very thick towards the fourth or fifth month of pregnancy. At first sight it might be thought to be the case, but it should be remembered that the muscular coat is almost always raised with it; and the subjacent cellular membrane, which, not being quite so distinct, is added to the mucous membrane, adheres to it, and is raised at the same time. At birth, the stomach of an infant is but little

dilated. It incloses a quantity of ropy mucus, with which there is sometimes mixed some small grumous particles, apparently composed of concrete mucus. In stillborn children there is found a layer of mucus more or less thick, adhering to the surface of this organ. Upon raising it with the nail or the back of the scalpel, the internal membrane is seen beneath this layer perfectly healthy. This mucus disappears after a few days; and this is, doubtless, what several authors, and Capuron in particular, mean by the name *saburra*, the removal of which it was necessary to effect immediately after birth. We shall see that the same thing exists in the intestinal tube, when we shall be able to appreciate more fully the nature of the advice given for the expulsion of this substance.”*

The same author, after describing the gradual formation of the intestinal tube, and its condition at different periods of foetal life, proceeds to examine the state of this organ at birth, the matters which it contains, and the phenomena of the first alvine evacuations. The duodenum has a rosy appearance, which is continued to the jejunum, but is less remarkable in the ilium. The jejunum has some traces of the *valvulae conniventes*; the villi are equally developed, and very often in the jejunum are found some separate mucous follicles, about the size of the head of a pin, and almost always white; some follicular plexuses, slightly projecting, also white, and often with a little black point on the top, as observed in adults, are met with in the ilium. The ilio-cæcal valve is a little projecting, and the opening which it surrounds extremely small; in most children it would be difficult to pass even a crow-quill. At this age it prevents the regurgitation of substances and even gas from the great intestines to the small, but allows a free passage for the contents of the small intestines to the large. This can easily be proved by passing a current of water through one or the other of the extremities of the digestive tube; in the one direction the water passes freely, while in the other it will meet with an insurmountable obstacle. Neither do the cæcum or colon as yet present their depressions and prominences in as distinct a manner as afterwards, or as they appear in adults. After birth, the internal membrane of the digestive passages gradually loses its habitual color, and becomes of a milky white, and continues for some time flocculent. During the whole of the first year it is remarkable for this appearance, and for the abundant secretion of mucosity. The matters contained in the intestinal canal of a young infant vary with reference to the color and consistence. Generally there is found in the duodenum and jejunum thick mucous substances, of a white color, adhering to the walls of the intestines, sometimes collected together in certain parts, and sometimes spread over them. They are often colored yellow, owing, probably, to the bile; and there are also found balls or small

* *Mal. des Enfants*, Stewart's Trans., p. 238.

masses of a green color, which are observed in the intestines a long time after the expulsion of the meconium. I have found them in a child eight or ten days old; it would appear that they do not possess any irritating property, for their contact never produces inflammation of the mucous membrane. It is very common, also, to find about the ilio-cæcal region an accumulation of yellow and frothing liquid; the large intestines are always filled with meconium of the consistence of pitch, and of a deep green color, a circumstance noted by all authors. When all the liquid parts of the intestinal tube are removed, there still remains a layer of thick mucus adhering to the internal surface of the canal, forming on it a kind of plastering. This layer may be raised with the nail, under the form of a pellicle, resembling, to a superficial observer, portions of the mucous membrane itself. It is probably this layer of mucus that certain practitioners regard as vitiated matters, or *saburra*, for the expulsion of which they have recommended purgatives from the time of birth. But whether this mucus be for no other object than protection of the mucous membrane when exposed to the contact of unaccustomed aliments, or whether it be a simple deposit of a fluid contained for a long time in the alimentary canal, attaching itself, without any use, to its surface, it never remains there but for a short time, and detaches itself, without the assistance of any purgative, by a kind of natural exfoliation. This exfoliation occurs in very thin lamellæ, which, being rolled together, form the small white flocculi so frequently met with in the stools of young children; and where the surface of the duodenum or jejunum is colored with bile, it is this layer of mucus that is colored, so that in removing it the color also disappears from the intestine. As soon as the child has commenced a new kind of alimentation, the contents of the intestines change their appearance, the phenomena of digestion, becoming, with respect to the manner in which it is performed, analogous to what it will be during the remainder of life. A great deal of importance is usually attached to the first discharge from the bowels; and nurses are eager to administer to a child just born some mild purgative, under the fear of retaining, for too long a time, a substance which absurd prejudices have induced them to regard as irritating, and as capable of exercising a serious effect on the system. I am far from entertaining any such ideas, for I can see in the meconium no irritating or chemical property; but I conceive that a prolonged retention of this matter may produce, if it be not evacuated, effects analogous to those which obstinate costiveness produces.

M. M. Rilliet and Barthez have drawn their observations from children somewhat older. According to their statement, the gastro-intestinal mucous membrane is of a grayish-white, or clear rose gray, the color varied by venous ramifications. Its thickness, which is not considerable, varies in different regions, as does its tenacity. The sub-mucous tissue is of a dull white color, rather thin in general, resisting, and intersected by venous arborizations, more voluminous but less

numerous than those of the mucous membrane. The muscular coat underneath is recognizable by the direction of its pale or rose-colored fibres. The mucous membrane varies in different situations; it is thinner and paler in the great *cul-de-sac* of the stomach, less consistent, and less firmly adherent to the subjacent tissue; and this change of character is often so sudden and so complete as to give the appearance of a line marking the limits of the *cul-de-sac*; in other cases the transition is gradual. The capacity of the stomach varies; it is often considerable, but, unless disease be present, this is a matter of no moment; in other cases the organ is much contracted. Of course the smoothness of the internal surface will be modified by these conditions. The mucous membrane of the *small intestines*, often colored by its contents in its superior portion, is of a grayer color than that of the stomach; it is tolerably thick in the duodenum, but gradually diminishes towards the inferior termination. Its adherence to the subjacent tissue is but slight, and slips may easily be raised even close to the valvulæ conniventes. The isolated follicles are contained in the thickness of the mucous membrane, and are not visible except under the influence of disease. The patches of follicles are, on the contrary, always visible along the free border of the intestine, and increasing in number towards its inferior portion, as in the adult. Numerous small black points are also observed, sometimes scattered irregularly, in other cases collected in different parts, and giving a grayish-black or black color to that part of the surface. In the large intestine the mucous membrane is thin at first, and goes on increasing to the rectum, and the authors remark that it is always thinner at the lower side of the natural obstructions of the canal, *e. g.* at the cardia, pylorus, caput cæcum coli; and from each of these points it gradually increases in thickness until we arrive at the next obstacle. The mucous membrane of the cæcum permits a number of venous ramifications, which disappear lower down, or only reappear in the rectum; and we find a considerable number of follicles, each marked by a gray spot, with a small opening of a darker color, which leads to its cavity.

Let me now point out a few of the changes which take place after death, and which require to be carefully distinguished from those which are the result of disease.

1. Obeying the physical laws, the fluids after death gravitate to the inferior parts of the body, and in the intestines we therefore find the vessels of the most depending portions filled with blood, and forming more or less extensive arborizations, which, however, are not always present, nor are other parts exempt from the same appearance.

2. These arborizations, however, are not always cadaveric; that is, they may be produced immediately before death, or in the act of dying, when the termination is accompanied by general congestion, as in asphyxia. When this is the case, the vessels have a deep violet color, and are rather situated in the sub-mucous than the mucous tissue.

3. At a later period the blood escapes from the vessels and colors

the mucous membrane, which it penetrates as if by imbibition, forming large spots of a dull red color, in which no vessel can be discovered. In other cases the blood distils through the membrane, and colors the mucus of the intestinal canal; or it may be effused beneath the mucous membrane, following the sinuous track of the vessels from which it escapes.

4. At a still later period, the mucous membrane acquires a green tinge similar to what may have been previously observed on the abdominal parietes; this is an evidence that putrefaction is considerably advanced.

5. There is another change about which there is considerable difference of opinion; I allude to softening of the mucous membrane, which by some has been regarded as the product of disease, and by others as a cadaveric change, and I can scarcely doubt that both are right. As far as my knowledge extends, I am quite prepared to agree with Rilliet and Barthez, who observe: "In conclusion, we believe that simple ramollissement of the stomach, and especially of its greater *cul-de-sac*, may exist both as a disease and as a cadaveric phenomenon; but that, considering the circumstances of temperature and putrefaction in which we ordinarily find it, we regard it, when discovered by dissection made twenty-four or forty-eight hours after death, as more frequently cadaveric than morbid. The intestinal mucous membrane, on the other hand, undergoes this change more frequently from disease than as a cadaveric change."

In conclusion, I will just enumerate the principal pathological changes which may be observed in the mucous membrane.

1. *Redness*, in the form of arborizations, bands, or vascular lines, or uniform.

2. *Softening*, in which the mucous membrane is reduced to a kind of pulp, so that in extreme cases it may be scraped off, but cannot be raised in strips at all. This degree generally coincides with the uniform red color.

3. *Thickening*.—This change may occur with or without softening; it gives prominence to the parts so affected, whether only a few points or a more extensive surface. The increased thickness is demonstrated by carefully cutting through the mucous membrane only, in different parts. These three changes are the result of simple inflammation, and may be observed in any part of the intestinal canal.

4. *False membranes*, which are more common than is supposed, but which are removed as secreted by the passage of matters through the intestinal canal. They may be deposited in small white patches here and there, or they may form a more extensive thin layer, white, gray, or yellow, slightly adhering to the mucous membrane, and often mixed with the faecal matter.

5. *Ulcerations*.—These are sufficiently common in typhoid fever and tubercular disease, and may be seated either in the mucous membrane or in its follicles.

6. *Pustules*.—It is very rare to meet with pustules in the stomach or intestinal canal, although such are recorded by Rilliet and Barthez.

7. *Softening, non-inflammatory*.—Three forms have been noticed by the authors just quoted:—1. Simple or pultaceous; 2. Gelatiniform; and 3. White or opaline ramollissement.

Although the usual signs of inflammation may be absent in these cases, it is by no means certain that the morbid change is not a more distant result of inflammation. The evidence we possess, carefully examined, would, I think, lead us to the conclusion that the colorless softening without vascularity, is probably, the termination of a series of morbid actions, of which inflammation was the beginning.

CHAPTER XIV.

INDIGESTION. VOMITING. WEANING BRASH.

THE affection which has been described under the term vomiting, and more recently termed indigestion, differs very considerably from the adult disorder so designated, although it appears equally independent of organic disease in many cases.

Vomiting is, no doubt, the prominent symptom, but we must distinguish between that which results from an unhealthy or irritable condition of the stomach, and that which is merely the expulsion of an excess of food. It is a natural effort of the stomach of infants, and a great advantage, that, when too much food has been swallowed, the excess is returned, whilst the proper quantity is retained, and the child is saved from the consequences of over-feeding. This is a species of organic intelligence which supplies the place of that knowledge which is afterwards acquired. The milk is generally thrown off in an unchanged condition, and the infant is so little annoyed by the vomiting, that it will often preserve its usual placid and cheerful countenance while the milk is regurgitating from its stomach. This variety of vomiting may, therefore, be regarded rather as a salutary than a morbid occurrence; for the superabundant nourishment, with which the digestive organs are habitually overloaded, would, doubtless, soon give rise to indigestion, and its various disagreeable consequences, if the stomach did not regularly relieve itself by throwing off a portion

of its oppressive load. Common sense will teach the mother in such cases to diminish the quantity of milk the child is allowed to take at each nursing, until it is reduced to the capacity of the digestive powers, and no other treatment will be necessary.

But the vomiting which occurs in the disease I am describing, does not necessarily result from the stomach being overfilled, but from its incapacity to digest what it has received, and an irritability which occasions it to reject it. It may be originally caused by over-feeding, but the effect continues after the cause has ceased. This indigestion may occur at any age. I shall notice it as we see it during suckling, after weaning, and at a later period.

Symptoms.—*During the first year of life*, while the infant is still at the breast, the earliest symptoms of the disorder we shall be able to observe will be a pallid look, languor, and considerable discomfort. The infant is evidently unwell; it cries and whines, and appears never easy except when at the breast. It sucks greedily, without appearing satisfied and shortly afterwards vomits the milk, either fluid as it received it, or curdled (and not a small portion—the surplus—but the whole, or nearly so), with evident distress, paleness of face, &c.

A good deal of stress has been laid upon the fact of the milk being curdled or not, as an evidence of the presence of a morbid amount of acid in the stomach. Undoubtedly it is not a natural state when the milk is rejected as a solid, firm curd, but it is certainly a mistake to suppose that no change takes place in the fluidity of the milk in healthy digestion. Underwood remarks: "Not that the milk ought not to curdle in the stomach, which it always must, in order to a due separation of its component parts, and which is the chief, if not the only digestion it undergoes in the stomach;" and experience confirms his observation, that it is only when the curdling is in excess that it is to be regarded as an evidence of disease. Upon this excessive coagulation, M. Billard has the following observations: "Van Swieten and Rosen have remarked that it is common to meet with milk coagulated in the stomach without being digested. The authors first mentioned attribute it to the superabundance of acid in the stomach. A very evident acid smell is often detected in the mouth of a child; like that, for instance, which is observed after an attack of indigestion. I found in fifteen infants that died with other affections than those of the digestive organs, the stomach filled with coagulated milk; there were but three exhibiting a slight injection of the stomach; in the remaining twelve the walls of this organ were white and perfectly healthy. I am inclined to think that this coagulation of milk proceeded from some other cause than inflammation. Does this result from the milk taken by the child abounding in caseine, or is it the presence of acid in the stomach that so quickly coagulates this fluid? Does this acid exist, in the first place, in the stomach? Is it the result of the decomposition of the milk? Does this indigestion depend upon the

want of vital activity and nervous action which is displayed in the stomach during the operation of the digestive functions? These are questions I am unable to solve; but, whatever be the cause of this phenomena, I point it out as the effect of a true gastric indigestion, without inflammation of the organ, and without apparent lesion of its walls; and I wish particularly to direct the attention of physicians to this fact, that they may not be led to conclude that a child is affected with gastritis whenever it is unable to digest the milk that it has taken, or when the milk is vomited some time after in a coagulated form." So that a minor degree of coagulation being a part of the healthy process of digestion, an excessive degree may be owing either to excessive acid, deficient nervous power or vital inaction; and, on the other hand, milk vomited unchanged, after it has remained some time in the stomach, is an equal evidence of an incapacity of digestion. Dr. Dewees says: "If there be a deficiency of acid in the stomach, and a vomiting be produced, the milk will come up unchanged. Nausea almost always attends this variety; the child may be observed to become pale and evidently to struggle against the efforts of its revolting stomach. The milk is rejected with great force in a large column; and not unfrequently a portion passes through the nostrils."

To return. The child is attacked by frequent vomiting, after which it looks pale and exhausted; but it is as eager as ever to suck again. Occasionally much alarm has been felt in consequence of blood being mixed with the ejected milk; but this is owing to the nipple having cracked and the child having drawn blood when sucking. The bowels are not necessarily affected; they are sometimes in a natural state, sometimes constipated, and occasionally too free. Nor does the child suffer generally from pain or tympanitis, although the stomach may be troubled with flatulence. This alternation of sucking and vomiting is gradually followed by emaciation and exhaustion, and a sinking of the vital powers, but there is no evidence at all of inflammation of the stomach. The child derives no nourishment from its food, and in the end, if relief be not afforded, dies of exhaustion from starvation. In such cases, however, it is not uncommon to have a new train of secondary symptoms occur, such as heaviness, stupor, convulsions, &c.; in fact, in all cases of prolonged disorder of the stomach and bowels, the most watchful attention should be directed to the condition of the nervous system, and the most prompt efforts made to relieve the earliest symptoms of disease of these organs. If relief be not afforded to this species of indigestion, the infant may linger on for five or six weeks, gradually become weaker, thinner, and more unable to digest its food, until at length it sinks from exhaustion or from some secondary attack.

At the time of weaning, or soon after, the child is very apt to suffer from indigestion, in consequence of the change of food. This disorder, however, is not confined to the stomach, but involves, apparently, the

entire intestinal canal. It may come on a few days after weaning, or not for some weeks. Dr. Cheyne has given an admirable history of this disease under the term "Atrophia Ablactatorum." "The first symptom," he says, "is a purging, with a griping pain, in which the dejections are usually of a green color. When this purging is neglected, and, after continuing for some time, there is added a retching, with or without vomiting: when accompanied by vomiting, the matter brought up is frequently colored with bile. These increased and painful actions of the alimentary canal produce a loathing of every kind of food, and naturally are attended with emaciation and softness of the flesh, with restlessness, thirst, and fever. After some weeks I have often observed a hectic blush on the cheek; but the most characteristic symptom of this disease is a constant feverishness, the effect of increasing griping pain, expressed by the whine of the child, but especially by the settled discontent of its features, and this expression of discontent is strengthened towards the conclusion of the disease, when the countenance has shared in the emaciation of the body. In the progress of the disease the evacuations from the belly show very different actions of the intestines, and great changes in the biliary secretion; for they are sometimes of a natural color, and at other times slimy and ash-colored, and sometimes lenteric. Towards the end of the disease the extremities swell, and the child becomes exceedingly drowsy; but these I rather conceive to arise from debility, than to be pathognomonic symptoms. It is remarkable, in the advanced stage of the disease, that the purging sometimes ceases for a day or two, but without any amelioration of the bad symptoms; nay, I think that children decay even faster than when the purging is most violent. The disease seldom proves fatal before the sixth or seventh week, and in this short time I have seen the finest children miserably wasted. I have seen, though rarely, a child recover after the disease had continued three or four months; and again, I have seen the disease cut short by death in the second, third, or fourth week, before it had reached the acme; the sudden termination having been occasioned by an incessant vomiting and purging, or by convulsions, from the immense irritation in the bowels."*

To this graphic description I have little to add, except that, in many instances, the symptoms of gastric disturbance precede those which indicate intestinal derangement, and which is the reason why I have introduced the disease here rather than under the head of diarrhoea. The disease, as Dr. Cheyne observes, is by no means rare, and if neglected, is very fatal, but if taken in time is sufficiently manageable. It is more common with children who have been weaned abruptly, and at an unusually early period.

At a later period, the child's stomach may become disordered, and an effort may be made for relief by vomiting or purging, or both, after

* Essay II. On Bowel Complaints, p. 16.

which the child may resume its usual health. Or the derangement may continue, the appetite may be impaired, and the food taken appear to disagree with the stomach; the child is pale, fretful, and uneasy, especially after a meal; complains of pain in the stomach and bowels, resembling colic or spasm; is troubled with flatulence; and occasionally the belly is swollen and tympanitic. The breath is sour, and there are acid eructations, with repeated vomiting of undigested or half-digested matters, after which the child seems somewhat relieved. I have noticed the prevalence of this form of indigestion, somewhat modified in different cases, during the hot weather of summer.

If this state of things continue, the intestinal canal becomes irritated, and purging sets in, and the evacuations are generally of a green color, accompanied by colic. The little patient is soon reduced in flesh and strength; his countenance is pale and depressed; his pulse weak, and sometimes quick; the appetite diminished, and the animal spirits sunk. Occasionally the food passes through the bowels almost unchanged, constituting the disease called lientery. In some cases the purging alternates with constipation. In process of time other organs become involved; the liver gives evidence of functional disturbance; but by far the most serious complication, and one by no means uncommon, is the head, as manifested by stupor, coma, or convulsions. This secondary affection, so common towards the end of gastric or intestinal diseases, places the patient in the greatest danger, from its occurring at a time when active treatment is nearly impossible, owing to the weak state of the child. No case requires greater watchfulness, none more judicious and skilful treatment, than these cases; and, do what we may, a large proportion die.

If no complication occur, the indigestion may often be cured, after an uncertain duration of from a week to a month; but it may also prove fatal from exhaustion.

Morbid Anatomy.—As a general rule, *post-mortem* examination reveals no trace of disease; now and then, as Billard has observed, we may find vascular ramifications in the coats of the stomach; but this may be either the normal condition of the stomach with food in it, or a cadaveric change. Ordinarily the stomach and intestines are more bloodless than usual, semi-transparent, and unequally distended with air. The mucous membrane is pale throughout, and occasionally softened. “The want of color,” Dr. Stewart remarks, “is almost always the first degree of a species of softening, which should not be confounded with a species of inflammation. The disease described by M. Cruveilhier, under the name of gelatiniform disorganization of the mucous membrane of infants, would appear, from the detail of symptoms, to be a violent species of the disease now under consideration. M. Dugès, in his *Manuel d’Accouchemens*, in speaking of a similar affection, remarks that he has found the interior coat of the intestines covered with a white mucous, of a pulpy consistence, and bearing a resemblance to imperfect chyle, and which inattentive observers might

mistake for the softened mucous membrane. The mucous follicles, he observes, could be still seen on the intestinal surface.”*

The *post-mortem* appearances in “weaning brash” are thus described by Dr. Cheyne: “I observed in every instance that the intestinal canal, from the stomach downward, abounded with singular contractions, and had in its course one or more intussusceptions; that the liver was exceedingly firm, larger than natural, and of a bright red color; and that the enlarged gall-bladder contained a dark green bile. In some dissections the mesenteric glands were swelled and inflamed; in others, however, they were scarcely enlarged, and had no appearance of inflammation. These contractions and intussusceptions were entirely of a spasmodic nature, as, in the latter, the contained part of the gut was easily disengaged from that which formed its sac, and in no part of the entanglement was there adhesion or even the mark of inflammation; and the contracted portions of the intestines were again permanently dilated by pushing the finger into them. These appearances lead me to imagine that weaning brash, in its confirmed state, is imputable to an increased secretion of acrid bile, or rather to the morbid state of the liver which occasions this; of which, however, I am afraid to attempt the explanation.”†

Causes.—*Before weaning*, indigestion may be caused by excess in the quantity of milk, or by giving the child the breast too often, or too soon after vomiting, in order to quiet it. Deficiency or excess of the nutritive qualities of the milk, or its possessing bad or irritating qualities, may also give rise to it; and the latter condition may be caused by errors of diet on the part of the nurse, and by her indolence, luxurious habits, giving way to passion, by the presence of the catamenia, by the too great age of the milk, and by too prolonged nursing, as I have heretofore observed. The process of digestion may be disturbed, and the gastric powers deranged, by tossing or moving the child about, too soon after suckling.

After weaning, the most common of all causes is some error in diet; the child is fed too much or too frequently, or upon improper food; and when the stomach, with the admirable organic intelligence which it possesses in childhood, rejects what is not proper for it, instead of taking a hint, and giving it a change of food, or at least a rest, more food is given, and probably of the same kind, so that the stomach becomes permanently deranged, and that which was a healthy process becomes a symptom of a morbid condition.

Another cause, and doubtless a frequent one, is dentition. The stomach and bowels are very apt to be more or less disturbed during this process; and, though distressing, it is the least injurious of all the

* Diseases of Children, p. 184.

† Essay II. p. 23.

reflex irritations to which dentition gives rise. It ceases, also, when the irritation is removed by scarification.

Underwood and others have attributed this vomiting to the suppression of accustomed discharges, or the sudden cure of cutaneous eruptions. Dewees doubts this, but Eberle mentions a case in which the child was attacked by vomiting whenever a discharge from behind the ears was dried up, and which was relieved by reproducing it.

Diagnosis.—The absence of permanent pain, tenderness, and fever, the weak quiet pulse, and clean tongue, will generally suffice to distinguish this complaint from gastritis. The success or failure of the treatment will also throw some light upon the matter.

But there are two other diseases with which it might be confounded at a certain period, and from which it is of the highest importance to distinguish it. Vomiting is often among the earliest symptoms of meningitis, at a period, indeed, when it sometimes requires a practised eye to detect more. But we may always find some nervous disorder, disturbed sleep, starting, staring, heaviness, flushed face, suffused eyes, headache, &c., none of which are remarkable in the present disease, and upon the presence or absence of which our decision must be made.

Again, vomiting occurs in strangulated hernia, but a careful examination, which in such cases, should never be omitted, will enable us to pronounce upon the presence or absence of the hernia.

Treatment.—The first object is to regulate and correct the food of the infant as to quantity and quality. If the disorder can be fairly traced to an excess of milk, of course it is easy to remedy that, and it should be done forthwith. But if, as is more frequently the case, we have reason to believe that the milk disagrees with the infant, the nurse should be changed, and a new one obtained, whose milk is of a suitable age. Nay, even if there be a doubt about it, it will be better to make the change. When satisfied about the nurse, I would advise that the infant should only be allowed to take half the usual amount of suck at a time, and have it oftener, if necessary, until the stomach recovers its tone.

If the bowels be confined, they should immediately be freed by an enema, as their action tends to quiet the stomach.

I have found nothing so effectual in tranquillizing the gastro-intestinal disturbance as the following mixture :

R.—Mist. aymgdal.,
Aquæ carui, āā ʒi.
Spts. ammon. arom. gutt xv.
Tincturæ opii, gutt. ij. vel. iij.—M.

A teaspoonful may be given, two, three, or four times a day, and at the same time some counter-irritant should be applied over the stomach :

either a poultice of mustard and linseed meal, a liniment containing a small quantity of laudanum, or a small blister.

Dr. Eberle recommends small doses of calomel and ipecacuanha. "I have repeatedly succeeded in arresting vomiting," he says, "from inordinate gastric irritability in infants, by exhibiting the eighth of a grain of calomel, with one-sixth of a grain of ipecacuanha, every hour or two, in conjunction with the application of a stimulating poultice or plaster over the epigastrium."* In obstinate cases he advises "a grain or two of morphia to be sprinkled on the surface of a small plaster of common cerate, and laid over the pit of the stomach." Dr. Stewart speaks highly of rhubarb and ipecacuanha. Dr. Underwood says, "a drop or two of the aqua kali, or a little Castile or almond soap, are excellent remedies, not only as they will correct acidity, but promote the secretion of bile, as well as a generous warmth in the great passages, and assist the digestion. For which purpose also, myrrh is an excellent remedy, when infants are a few months old."†

The gums should be carefully examined, and a free incision made, if there be the least evidence of irritation from the teeth.

Dr. Cheyne recommends that in the beginning of "weaning brash," when the attack is slight, we should give a dose or two of rhubarb, at intervals of two days, and a half or a third of a grain of ipecacuanha, with six or eight of prepared chalk, and some aromatic powder, every four or five hours. If there be much griping, an anodyne enema may be given. The diet must also be regulated carefully, and animal substances are better than vegetable. Eggs, fine ship biscuit, arrowroot custard, the juice of lean meat, plain animal jellies, and milk, are the chief articles of nourishment. A wet-nurse would undoubtedly be the best, if the child were young and would take the breast; and the best substitute I have found for this is ass's milk. In the severe cases, Dr. Cheyne found more benefit from half a grain of calomel twice a day for some time, with anodyne enemata for the relief of the pain, than from anything else.

When the child is still older, if his stomach have been overloaded, or if he have taken indigestible food, it will be well to commence with an emetic, after which we may have recourse to small doses of laudanum, with or without ammonia, and external irritation. The bowels must also be kept free, but if diarrhœa be present, with much pain, an anodyne enema may be administered. If there be any evidence of biliary derangement, small doses of calomel, or hyd. c. cretâ, will be very useful, followed occasionally by a purgative, or combined with an astringent, according to the state of the bowels.

With children of three or four years old, I have succeeded very well by combining an alkali with some vegetable bitter, after the irritable

* Diseases of Children, p. 210.

† Diseases of Children, p. 225.

state of the bowels has been relieved. Carbonate of soda, magnesia, or lime-water and milk, may be given if there be an excess of acid in the stomach, and the dilute muriatic acid, or lemonade, if there be a deficiency. Dr. Condie speaks very highly of a combination of magnesia, extract of hyoscyamus, calomel, and ipecacuanha; and also of a few drops of spirits of turpentine, or the ethereal solution of camphor. External irritation, by mustard, liniment or blister, is of great use; and if there be colic, laudanum may be applied externally as well as internally. Sometimes great relief is afforded by fomentations, or by a large linseed poultice to the belly. When the disease has been arrested, tonics may be necessary. I have found great benefit from two or three grains of carbonate of soda, and as much powdered columba, three times a day. "In that form of infantile indigestion in which softening of the stomach is most likely to occur, a trial may be made of hydrochloride of iron, which appears to have frequently succeeded in restoring the healthy functions of the stomach in the hands of Pommer, Herzt, Cammerer, Droste, and others."*

The diet must be carefully regulated, and it is far better to retrograde a little, and substitute a simpler diet than the one to which the child has been used. Milk, eggs, arrowroot, panada, &c. will answer better than animal food.

When the head is becoming involved, no time must be lost in making the best use we can of derivatives and counter-irritants. Mustard cataplasms or blisters to the legs, blisters to the head or neck, cold lotions to the head, &c., must be tried in succession. In few cases can we venture to take blood or apply leeches, and yet the disease must be checked quickly if the child is to live. Meantime, the treatment for the primary complaint must go on, except, perhaps, a more sparing use of laudanum.

If the child be greatly reduced, more nourishment must be given; jellies, broths, or beef-tea will be necessary, and sometimes wine whey; nor have I found the head symptoms increased by it, but frequently lessened as the extreme exhaustion was relieved.

* Condie on Diseases of Children, p. 203.

CHAPTER XV.

GASTRITIS. INFLAMMATION AND SOFTENING OF THE STOMACH.

INFLAMMATION of the stomach and its consequences in children, have not received very much attention from authors, until comparatively recent times, although it is probable that some of the cases described under the term "vomiting" were really of this nature. Saillant,* Fleisch,† Lesser, Maunsell, and Evanson,‡ and others, have noticed the disease, but we are more indebted to Dunglison,§ Billard, Stewart, Condie, Rilliet and Barthez, &c. Jaeger,|| Camerer, Morgagni, Sandifort, and Hunter, described a softening occurring at the larger extremity of the stomach; and since their time Ramisch,¶ Vogel, Hufeland, Cruveilhier,** Billard, Bouchut, Barrier, Rilliet and Barthez, &c. have thrown much light upon the subject, although there are still questions left undecided.

Inflammation of the stomach is by no means a frequent disease, nor is it always so well marked as to enable us to distinguish easily between it and functional disorder, such as I described in the last chapter; and moreover, it is frequently combined with irritation or inflammation of the intestines. It may be either primary or secondary, but, according to Rilliet and Barthez, far more frequently the latter than the former.

Symptoms.—The symptoms are not always very characteristic, and in some cases are very obscure. In certain cases Rilliet and Barthez remark that the disease is completely latent, revealing itself by no symptom, or by some trifling phenomena which escapes notice; as for example, one or two vomitings after medicine containing tartar emetic and ipecacuanha; or vomiting, apparently sympathetic, at the commencement of the primary malady. Among these cases we find erythematous, pseudo-membranous, or ulcerated gastritis, and above all, softening of the stomach.†† Ordinarily, however, as M. Saillant observes, the child complains of more or less pain, often very severe,

* Mem. de la Soc. de Med. 786, p. 1327.

† Die Entzündung, &c. p. 230.

‡ Diseases of Children, p. 277.

§ On Diseases of the Stomach and Bowels in Children, 1824. p. 180.

|| Hufeland's Journal, May, 1811, and Jan. 1813.

¶ Aug. Lit. Zietung, No. 56, May, 1821, p. 447.

** Anat. Path., Livraison 4-7. &c.

†† Mal. des Enfants, vol. i. p. 405.

occurring in paroxysms at short intervals, with violent contortions of the body. Vomiting is a common occurrence, both at the beginning and during the course of the disease, though there may be considerable intervals. The matters ejected are, first, the ingesta, then a greenish or yellowish fluid, and in some rare cases, according to Denis,* blood. We must, however, be careful, if the infant be at the breast, not to mistake the source of the blood, which may have been drawn from the mother's nipple. In some of the worst cases the vomiting is excessive as to quantity, and incessant. Billiet and Barthez have remarked that the vomiting is more troublesome when softening occurs, than in simple gastritis, although there is often a sudden and complete cessation for some time before death.

The bowels may or may not be disturbed. In some cases there is rather obstinate constipation ; in others, and more frequently, there is diarrhœa. The abdomen is generally swollen and tympanitic ; the epigastrium hot, tense, and tender on pressure ; the thirst great ; the appetite lost ; the tongue sometimes loaded and white, sometimes dry and red at the point and edges. The urine is generally scanty ; the pulse is quick and small, but not weak ; the skin hot and dry.

Thus then the principal symptoms are the heat, tension, pain, and tenderness of the epigastrium, with vomiting, and a quick pulse and fever.

But the attack "may become chronic and continue for a length of time, with occasional vomiting, some degree of tension and tenderness of the epigastrium, irregular appetite, occasional diarrhœa alternating with costiveness, a dry and harsh condition of the surface, febrile symptoms of a remittent character, and progressive emaciation. White softening of the stomach, with perforation may occur in these cases ; or, the irritation being transmitted to the brain, effusion into that organ may take place ; or, tubercles becoming developed in the lungs, the patient may die with all the symptoms of tubercular phthisis."†

Inflammation of the stomach may result in softening, ulceration, or gangrene. I do not know that there are any symptoms by which we may detect the two latter occurrences during life. Under the title "gelatinous softening," M. Cruveilhier has described a well-marked disease ; and more than once Billard has seen an accurate diagnosis made by M. Baron. M. Billard thus enumerates the symptoms : "The disease usually commences with symptoms of violent gastritis, such as tension and pain in the epigastric region ; the substances discharged by vomiting are not only the milk and drinks, but yellow and green fluids, occurring either immediately or long after eating or drinking. There sometimes exists a diarrhœa, varying in different subjects. It

* *Mal. des Enfants Nouveaux-nés*, p. 46.

† *Condie on Diseases of Children*, p. 204.

will return after having ceased for one or two days. The stools are often green, like the matters discharged by vomiting. The skin is cold at the extremities; the pulse, generally irregular, is, however, very inconstant; the face continually expresses pain, and is wrinkled, as if the child were crying; the cry is painful, and the respiration jerking, and the general restlessness induces a belief of the existence of a cerebral affection. To these symptoms succeed a general state of prostration and insensibility, occasionally disturbed by a return of pain, producing from time to time the same restlessness which appeared at the commencement of the disease; and lastly, at the end of six, eight, or fifteen days, and sometimes later, the patient sinks, wasted by wakefulness, continual vomiting, and pain. In very young infants scarcely any fever is manifested in the midst of this disorder. When the disease is chronic, the progress of the symptoms is slower.”*

Morbid Anatomy. — On *post-mortem* examination, the stomach exhibits the different modifications of inflammatory action I have recently noticed. 1. There may be found a diffused redness in some parts, or it may extend in bands or lines along the longitudinal folds, or in vascular ramifications; such is the erythematous gastritis. 2. Or we may discover in some portion of the stomach a pseudo-membranous secretion, analogous to that in muguet. 3. The follicular glands may be chiefly affected, enlarged, prominent, and ulcerated. 4. The inflammation may have terminated in gangrene, with general disorganization of the tissues, or a limited disorganization resembling an eschar.† 5. The mucous membrane, or all the tissues of the stomach, may be softened.

But a little more detail is necessary touching this “ramolissement gelatiniforme,” which is thus described by M. Cruveilhier: This softening always proceeds from the interior towards the exterior. There is at the beginning simple separation of the fibres by a gelatinous mucus, and in consequence the parietes are thickened and semi-transparent. Shortly after, the fibres themselves are involved and disappear, so that the softened stomach or intestine resembles transparent gelatin in the form of a tube or a portion of a tube. If the transformation be complete, the disorganized portions are removed, layer after layer, those which remain becoming gradually thinner. The peritoneum alone resists for some time, but at length it is attacked, worn, and gives way, and perforation of the stomach results. The parts thus transformed are colorless, transparent, apparently inorganic, completely deprived of vessels, and exhaling an odour resembling that of milk. The softened portions are decomposed much less quickly than the

* Mal. des Enfants, Stewart's Trans. p. 267.

† Rilliet and Barthez, Mal. des Enfants, vol. i. p. 459. Denis, Mal. des Nouveaux-nés, p. 56.

unaltered portions. Boiling, which converts the stomach and intestines into a jelly, gives a perfect idea of this morbid alteration.*

M. Billard has described two forms; the first answering pretty accurately to the above description of M. Cruveilhier, he regards as pathological, but not the second species, in which the gastric tissues are simply deprived of color and softened.

The great pathological questions connected with this morbid change are: 1. Is it a pathological or cadaveric change? 2. If pathological, is it the result of inflammation or a disease *sui generis*?

M. Valleix says: "It seems to me impossible, in the present state of science, to distinguish, during life, the cases of simple pale softening with thinning, from those in which the softening is associated with evident traces of inflammation;"† and further on he gives his opinion that it is the result, either pathological or cadaveric, of chronic gastritis. M. Billiard observes, "What inference shall be drawn from the preceding facts and considerations? That the gelatinous softening of the stomach consists in a disorganization of the mucous membrane of this organ, caused by intense inflammation, acute or chronic; that this disorganization is characterized by an accumulation of serosity in the walls of the organ, a swelling and gelatinous consistence of the mucous membrane at a part usually circumscribed, situated generally in the larger curvature of the organ, and round which there are more or less evident traces of acute or chronic inflammation; that this disorganization entails others, may give rise to spontaneous perforation causing speedy death; and that it may be developed not only at the period of the first dentition, as in most of M. Cruveilhier's cases, but even in very young infants, of which I have reported examples."‡ Rilliet and Barthez regard this as a secondary lesion, and as most likely the result of inflammatory action. M. Bouchut denies that it is an isolated disease, but a consequence of the acidity of the fluids contained in the digestive canal.§ Jaeger, Camerer, and Zeller refer it to a paralysis of the nerves of the stomach, with increased acidity of the gastric juice. Cruveilhier and Rokitsansky admit two kinds of softening, one pathological, the other cadaveric. Rokitsansky conceives that the softening of the stomach in children is pathological, and dependent upon a disease which he regards as almost peculiar to early life. M. Barrier differs from those who regard it as a specific disease; he thinks it most frequently cadaveric and chemical, but, if pathological, that it is the result of an anterior morbid condition.||

Dr. Dunglison considers that there is little difficulty in pronouncing

* Anat. Path., livr. 4-7, &c.

† Guide de Med. Prat., vol. v. p. 188.

‡ Mal. des Enfants Nouveaux-nés, &c. p. 232.

§ Mal. des Enfants Nouveaux-nés, p. 231.

|| Mal. de l'Enfance, vol. ii. p. 118.

it the result of previous inflammation.* Dr. Carswell agrees that it may be either cadaveric or pathological; and that when it is the latter the symptoms are those of gastritis or enteritis; and he adds, that there are no symptoms referable to the state of softening which we have described, considered in itself, and as a termination of inflammation of the mucous membrane."† Dr. Stewart regards this softening, as well as the other morbid changes, to be the result of inflammation.‡ Dr. Condie remarks: "Without denying that the stomach may be dissolved after death, in consequence of the generation in its cavity of an excess of acid; and being well aware that a softening of the tissues of the stomach and of other parts of the alimentary canal may be produced by causes affecting the nutrition, and impairing the cohesion of the various tissues, altogether independent of inflammation, we are still convinced, from the result of our own observations, that the gelatinous softening, so frequently observed in children who have died of acute gastritis, is invariably the effect of intense inflammation of the mucous and other tissues of the stomach."§ Dr. West "has not been able to discover any peculiarity in the character of such symptoms (of disordered functions), nor even any constancy in their occurrence; nor have I observed that the disease of which the infant died has exercised any appreciable influence in predisposing to softening of the stomach, or in preventing its occurrence."|| Dr. West also mentions a recent theory of Dr. Elsässer¶ "He refers the alteration of the tissues not to the gastric juice itself, but to the acids generated during the decomposition of the food contained within the stomach and intestines at the time of death, and endeavors to account for the frequency of the occurrence in the case of infants, from the facility with which a free acid is generated in the milk which forms the chief part of their sustenance. According to his researches, which appear to have been carefully conducted, the change never ought to take place when the stomach is empty, but his assertion that it never does is opposed to universal experience." Further, the same excellent writer mentions, that in Herrich and Popp's work** there is "a table of 104 cases in which softening of the stomach was found after death from different causes and at various ages. In no instance were symptoms observed that would have enabled any one to pronounce, beforehand, that softening of the stomach would be discovered after death. In by far the greater number of cases the stomach was empty, showing that the

* Diseases of Stomach and Bowels, p. 183.

† Cyclop. of Pract. Med., vol. iv. pp. 13-15.

‡ Diseases of Children, p. 249.

§ Diseases of Children, p. 206.

|| Diseases of Infancy and Childhood, p. 366.

¶ Die Mageneweichung der Säuglinge, Stutgard, 1846.

** Der plötzlichen Tod, aus inneren Ursachen, p. 330.

cause was very often independent of digestion ; while the period of childhood, the rapid course of the fatal disease, and death from cerebral affections, were the only circumstances that appeared to have any clearly appreciable influence in favoring its production."

It appears, then, that redness with thickening or softening, or both, are undoubted proofs of inflammation ; that false membrane, ulceration, and gangrene are equally conclusive evidence of previous or accompanying gastritis ; but that pale, gelatiniform softening may be either the result of disease or a change which takes place after death. The balance of evidence is in favor of one at least of the forms of this curious alteration of structure being the result of inflammation, but the cause of the other is uncertain.

Causes.—Gastritis may arise from the continued use of improper food converting the indigestion described in the last chapter into actual inflammation, or from eating acrid substances, or swallowing poisonous matters. Nay, more, it would appear from the observations of Rilliet and Barthez that the continued use of powerful remedies, such as tartar emetic and croton oil, in secondary affections, gave rise to gastritis, even though the dose were moderate. Although these medicines are valuable, and in some cases necessary, still this should be a warning to use great care and watchfulness in their administration.

As a general rule, I have not found one sex more liable to the disease than the other ; but of thirty-one cases of gastritis, observed by Rilliet and Barthez, twenty-three were boys, and eight girls ; and of twenty-seven cases of softening, fourteen were boys, and thirteen girls. The latter was much more frequent before the age of six than afterwards ; the former nearly equal at all ages. Children of weak constitutions, or who have been exhausted by disease, seem more liable to the complaint.

The usual exciting causes, cold, damp, exposure, bad food, crowding, &c., may influence the production of this disease as well as others ; but we find that it is frequent as a secondary affection, and the principal diseases in the course or towards the termination of which it occurs are, meningitis, meningeal apoplexy, pneumonia, and the eruptive fevers. In many cases, particularly in young infants, the inflammation of the stomach is preceded by an attack of stomatitis ; in others the stomatitis occurs subsequently to the gastritis.

Diagnosis.—The most characteristic symptoms of gastritis are, pain, heat, tenderness and tension of the epigastrium, with vomiting ; and when these are present we can have no doubt of the nature of the attack nor any difficulty in distinguishing it from the indigestion I described in the last chapter ; but in many cases these symptoms are less marked, and in some they are absent ; and then, undoubtedly, it will be difficult, if not impossible, to arrive at any certainty. We have already seen, on the highest authority, that there are no symptoms which indicate the occurrence of softening.

Treatment.—The first indication is, of course, to remove every possi-

ble cause. If the child be young, it will be well to change the nurse, or, if older, to substitute some bland, easily digested food for that it has been habitually using. If it be teething, the gums must be lanced freely; and if the bowels are confined, a purgative enema should be given at once.

If the symptoms of gastritis should occur during the treatment of another disease, we must, of course, give up the use of all powerful and irritating medicines, and seek to accomplish our object in some other way. Should the patient be tolerably strong, and the gastritis primary, or if secondary and the child not much reduced, it will be advisable to apply a few leeches to the epigastrium, limiting the amount of the bleeding, and, after that has stopped, applying a light, warm, linseed-meal poultice.

If, however, the child cannot bear this, or if partial relief only be obtained by it, some irritating application will be advisable—a pretty strong liniment, mustard poultice, or a blister. I am inclined to think that the latter is, on the whole, less painful, as well as more effectual. Great advantage is sometimes derived from dressing the blistered surface with ointment in which there is a small quantity of opium or morphia. M. Billard advises the tartar emetic ointment; but I should hesitate to use this, on account of the gastric irritation it sometimes occasions, even when applied externally.

The more distressing symptoms, vomiting, heat at the epigastrium, &c., may often be soothed by very cold drinks, or by a small fragment of ice swallowed now and then.

There is no great choice of internal medicines: a minute dose of calomel, or the hyd. c. cretâ, two or three times a day, with a little chalk and opium, or Dover's powder, will be useful. Or we may order a mixture with mucilage, syrup, and spearmint water, and one, two, or three drops of laudanum or of prussic acid to the ounce, of which a teaspoonful may be taken three or four times a day.

Dr. Condie gives from one-sixth to one-half of a grain of calomel every one or two hours. "This we have known," he says, "in a large number of cases, to suspend very promptly the irritability of the stomach, and to produce a favorable change in the symptoms generally. In cases attended with frequent, thin, acid evacuations from the bowels, the calomel we have found very generally to arrest the diarrhœa and render the stools of a more consistent and natural appearance. We ordinarily combine with each dose of the calomel a grain or two of calcined magnesia, and give it mixed in a little mucilage; but when there exists very great irritability of the stomach, we direct the calomel, combined with a few grains of powdered gum acacia, to be placed dry upon the tongue, the child being shortly afterwards given to drink a spoonful of thin mucilage."*

* Diseases of Children, p. 207.

The diet must be carefully arranged—simple, bland, and unirritating it ought to be. Milk in any form, milk and lime-water, mucilage, blanc-mange, arrowroot, tapioca, sago, &c., may be used according to the age of the child. After weaning, I have found ass's milk a very nice substitute for cow's milk. But the quantity is as important as the quality; it will be quite necessary to diminish the usual amount, nay, in some cases, to give only what is necessary to support life.

There is no special treatment for softening of the stomach; the remedies employed for the gastritis, if they are successful, will supersede the necessity of others for the ramollissement, and if they fail we have none other more effectual. Rilliet and Barthez recommend chiefly the gummy extract of opium, or if this cannot be given internally, muriate of morphia is to be sprinkled over a small blistered surface at the epigastrium. Dr. Lion, of Breslau, depends principally upon external means and a suitable diet, very small quantities of food at a time, a warm bath, mild enemata, exercise in the open air, an aromatic plaster to the stomach, and internally the decoction of acorns, carbonate of iron, or the tinct. ferri muriatis.*

Chronic gastritis may be treated by nearly the same means; leeches will not be necessary, but small and repeated blistering will be most advantageous, with a warm bath occasionally, and mild unirritating diet. Dr. Condie speaks highly of a combination of calomel, ipecacuanha, and hyoscyamus. The state of the bowels must be carefully regulated.

CHAPTER XVI.

DIARRHŒA. CHOLERA INFANTUM. ENTERITIS.

THERE is no complaint so common in infancy and childhood as disordered bowels, and this we can easily understand, on account of the delicacy of the mucous membrane, and the novelty, so to speak, of the

* Ranking's Abstract, vol. i. p. 177, from Casper's Wochenschrift, No. 34.

functions it is called upon to fulfil, in the first instance; and the variety and irregularity, both of quantity and quality, of the food submitted to it in after years of childhood, to say nothing of the reflex disturbances arising from irritation of other organs, and of which this is the most frequent seat. This disorder of the bowels varies in extent, intensity, and results, in every possible way. In some there is merely an increased looseness, temporary, and without any ill effects; in others the purging continues long, with some inroads upon the constitution, but without any deviation from the normal condition of the discharges. Again, the quantity of the discharges may not only be increased, but the quality may be very much changed, indicating in some cases a more extensive, in others a more serious morbid action; and lastly this disordered function may be accompanied with symptoms which indicate the presence of inflammation, whose actual existence may be proved after death. And yet it is often very difficult to draw the line between functional disturbance and organic disease. The symptoms may be identical, or nearly so, and the results may be analogous. I have, therefore, thought it better to include all in the one chapter, noting, so far as I am able, the gradations and the symptoms significant of each.

Let me remark, also, that although for the convenience of description, gastritis, enteritis, and colitis are treated separately, yet we more frequently find them conjoined in practice, as gastro-enteritis or enterocolitis, than isolated, as the reader will find them in books. This is an inconvenience which cannot be altogether avoided. Diarrhœa, then, whether functional or the result of inflammation, may be either acute or chronic, either primary or secondary.

Symptoms.—Dewees, Eberle, and others have classified diarrhœa according to the character of the discharges, in the following manner:*

1. *Feculent Diarrhœa*, in which the discharges are increased in quantity and frequency, but preserve their natural character, the

* M. Billard divides the disease into erythematous gastritis, with or without alteration of secretion, follicular enteritis, and enteritis properly so called. M. Valleix describes simple enteritis and enteritis combined with muguet. Rilliet and Barthez treat all varieties under the title of gastro-intestinal inflammation. M. Barrier speaks of acedent, follicular, serous, flatulent, and verminous diacrisis. M. Bouchut and Dr. West made a division into: 1, catarrhal diarrhœa; 2, inflammatory diarrhœa. M. Trousseau divides the diarrhœa of infants into four species: 1, bilious; 2, mucous; 3, lenteric; and 4, choleric diarrhœa, or cholera infantilis. M. Legendre regards the majority of cases as alterations of secretion, and the morbid lesions rather as their consequence than their cause.

evacuations being preceded by slight nausea, and accompanied by some pain.

2. *Bilious Diarrhœa*.—In this species the fæces are loose, copious, and of a bright yellow or green, and the bowels are stimulated to inordinate action by an overflow of bile, either vitiated or not. This complaint is very frequent among our children during the heat of the summer, or as the fall approaches. The influence of a hot sun upon the action of the liver is well known to every body. It is familiar to common observation that after a spell of very warm weather even the healthy evacuations of the adult give evidence of its rapid formation, and sometimes of its abundant absorption. Thus the fæces are observed to be loaded with bile, and the urine to be deeply tinged with it; and when the complaint of which we are treating seizes upon children, it is called the "liver complaint." This action of the bowels, as in the species just considered, sometimes relieves them of their stimulating contents, and will thus effect its own cure; hence this species, like the others, may be ephemeral, and may not be more formidable than the feculent species, unless the formation of bile goes on almost indefinitely, or fever be provoked.

3. *Mucous Diarrhœa*.—The evacuations in this variety contain a considerable amount of mucus, or may perhaps consist almost entirely of it. The discharge may not be very frequent nor very large; there is generally some little tenesmus, and occasionally a little blood. Ordinarily, their color is greenish, or light green, and very offensive. Sometimes they resemble chopped spinach; at other times yellowish or greenish, with a very bad odour. Dr. Graves regards this green matter as a secretion from the mucous membrane of the small intestines, and not bile. Drs. Simon and Golding Bird* consider it owing to blood which has undergone a chemical change. In common with the latter physician, I have observed that in many cases these green stools are originally yellow, but become quite green in an hour or two. The mucus is at first thin and transparent; afterwards it becomes thicker, opaque, and almost puriform. This form appears to arise from sudden transitions of the weather, or from a sudden chill.

4. *Chylous Diarrhœa*.—In this form the discharges are whitish or milky. There appears to be rather a deficient secretion of bile, than any obstruction to its escape, as it is never attended by jaundice. This milky fluid is supposed by some to be chyle, and Dr. Dewees asks why the lacteals do not absorb it? and he debates whether this arises from their incapacity or from the badly concocted nature of the chyle. Might it not be well to precede these by another question—whether this fluid be chyle at all, and not rather a morbid secretion from the intestines?—which I am inclined to believe. A child thus attacked

* Med. Gazette, Sept. 1845.

becomes rapidly weak and emaciated, and, if not soon relieved, sinks from exhaustion.

5. *Lienteric Diarrhœa*.—This is characterized by the transit of the food nearly unchanged through the alimentary canal. It sometimes follows some of the other species, but more frequently dysentery. The child is uneasy after eating, and soon has a desire to go to stool, when it passes the food taken shortly before. "It generally," says Dewees, "commences during the chronic state of diarrhœa, by showing, perhaps, that some one article of diet only has passed the bowels unchanged, as potato, apple, or other vegetable substance or fruit, which has been incautiously given to the child. This is pretty soon followed by other articles, as meat, &c., and finally everything almost that enters the stomach is speedily conveyed through the intestines, with little or no appearance of having been acted upon by the powers of the stomach. The appetite is sometimes voracious in this disease, and the thirst is always considerable."* Dr. Mason Good thinks that there is a deficiency of biliary secretion, as in the last variety; but with this opinion Dr Dewees' opinion does not agree: he considers that the "complaint is seated altogether in the stomach itself, and owes its existence to the too great irritability of this organ; for no sooner is food lodged in it, than it makes efforts by an increased peristaltic action to discharge it, and the intestines transmit it with equal speed to their extremity, there to be discharged."

So much for the varieties of the evacuations of diarrhœa. The other symptoms will vary in different cases, but not altogether according to the peculiar discharge. There is generally a certain amount of uneasiness and pain; sometimes this is very considerable, accompanied by rumbling in the bowels, and an escape of flatus. There is often considerable tenesmus and forcing, so that the child is very unwilling to cease its efforts, and these are sufficient in many cases to cause a troublesome prolapse of the anus. This seems to be the result of relaxation of the spincter ani, from the frequent discharges, and the violent forcing efforts made by the child. When once it occurs, it is generally reproduced with each evacuation, and may degenerate into a habit that will persist after the diarrhœa is relieved.

If the discharge be considerable, the child is rapidly reduced in flesh, and in young infants the muscular substance becomes quite soft and flabby. It is also much weakened, so as not to be able to run about or walk without great fatigue. There is an expression of weariness, depression, and sinking about the face, in some cases amounting to collapse, until reaction takes place. The eyes are sunk, surrounded by dark circles, the features are sharpened, and in prolonged cases the child acquires an appearance of age. The tongue may be either white and coated, or red, and occasionally there is a curdy matter, something

* Diseases of Children, p. 391.

like the commencement of muguet. The thirst is greatly increased, sometimes quite intense, with great dryness of the mouth.

At first the pulse is but little altered, but if the disease continue long and severe it becomes very quick and small, with hot skin and other evidences of fever. The abdomen is rarely tender on pressure, but it is sometimes distended by flatus; more frequently, I think, at least in the earlier stages, it appears shrunk, concave, and empty.

In some cases we find a sudden collapse, resembling that of cholera, after which the child rapidly sinks, unless reaction can quickly be produced.

CHOLERA INFANTUM.—There is, however, another variety of diarrhœa which I must notice, and which seems to be far more frequent in America than in these countries. It is not, however, limited to America, but is common in other warm climates. The reader will find most valuable information upon this disease in the essays of Dr. Rush (1789), Dr. Millar (1800), Dr. James Mann (1805), Dr. Jackson, Dr. Horner (1829), Dr. Parker (1857), and in the excellent treatises of Dewees, Eberle, Stewart and Condie.

It appears more common in the Southern and Western States during the months of July, August, and September, and chiefly in the cities. In Philadelphia it is more frequent than in New York or Boston: in the latter city it has been doubted whether the disease exists in its genuine form. In Philadelphia, during a period of ten years, from 1835 to 1844, inclusive, 2583 infants perished from this complaint, being nearly eleven per cent. of the whole number of infants under five years of age who died during that period, and 5.3 per cent. of the entire mortality of the city. Dr. Condie further remarks that "the disease occurs as an endemic in all the large cities throughout the Middle and Southern and most of the Western States, during the season of the greatest heats, making its appearance and ceasing earlier or later, according as the summer varies in the period of its commencement and close. Thus in Pennsylvania, Maryland, and Virginia, Kentucky and Ohio, it commences sometimes early in the month of June, and continues until October, prevailing to the greatest extent in July and August, whilst in the more southern States it appears as early as April or May, and frequently cases of it occur until late in November. Its only subjects are infants, chiefly those between four and twenty months of age, seldom attacking them younger or older, being commonly confined to the period of the first dentition. So generally is this the case, that an infant's second summer is considered by mothers as one of unusual peril; and should it escape at that age an attack of cholera, or pass safely through the disease, it is considered to have a fair chance of surviving the period of infancy."* In Massachusetts, in

* Diseases of Children, p. 233. During the present epidemic of

five years from 1844 to '48, inclusive, there were 852 deaths from this disease, and in Baltimore it was epidemic in 1848.

The disease is often preceded by diarrhœa, but in the majority of cases, according to Eberle, the vomiting and purging commence together, with no other premonitory symptoms than languor, fretfulness, loss of appetite, or a morbid craving for food. In whatever way it commences, however, the characteristic vomiting and purging soon appear, with great prostration, emaciation, and sinking. From the beginning the pulse is quick, small, and somewhat tense. The tongue is covered with a slight white fur at first, but as the disease advances this may disappear, and the tongue assume a bright, dry, and polished appearance. "At first the discharges from the bowels usually consist of a turbid, frothy fluid, mixed with small portions of green bile, or of a nearly colorless water, containing small flocculi of mucus. After the disease is fully developed, the evacuations very rarely exhibit any traces of bilious matter, the biliary secretion being evidently entirely suspended. In some instances the disease commences and proceeds with such violence as to exhaust the vital powers and terminate in death in the course of a single day. More commonly, however, the vomiting and purging are not so rapid as to prostrate the system immediately, and the disease continues for five or six days before convalescence begins or fatal exhaustion ensues. In many instances the vomiting, in the course of four or five hours, becomes less and less frequent, and finally ceases altogether, or recurs two or three times daily, while the diarrhœa goes on until at last it assumes a strictly chronic character. In the early stages of the disease the little patient is evidently harassed with painful and distressing sensations in the stomach and bowels; and when the discharges are violent and very frequent, the muscles of the abdomen and even those of the extremities are apt to become affected with spasmodic contractions. If the disease do not terminate fatally during the first few days, rapid emaciation ensues, the hands and feet become cold and pale, while the head and body are always preternaturally warm; the skin is usually dry and harsh, and acquires a peculiar welted appearance, particularly on the inner part of the thighs and over the abdomen. The countenance becomes pale and contracted, the eyes inanimate and sunk, the nose sharp, and the lips

Asiatic cholera (1849), my friends Drs. Asken and O'Reilly inform me that the proportion of children under five years of age admitted into two of the hospitals is in the proportion of 1 child to $25\frac{1}{2}$ adults, as follows: Brunswick-street Hospital—total number of cases, 407. Children, males, 4; females, 8. Died, males, 1; females, 4. Cured, males, 3; females, 4. Green-street Hospital—total number of cases, 797. Children, males, 15; females, 16. Died, Males, 7; females, 12. Cured, 12.

thin, dry, and wrinkled. The thirst is always very great, more especially after the disease has continued for some days, and no drink is palatable but cold water, which is generally thrown up soon after it is swallowed. Food of every kind is usually loathed and refused. If the disease be not subdued or moderated by proper remedial means, the little patient by degrees becomes somnolent; he sleeps with the eyes half open, rolls his head about when awake, and at last sinks into a state of insensibility and coma, and dies in a paroxysm of convulsions, or under symptoms resembling those of acute hydrocephalus. When the disease is of protracted duration, or assumes a chronic form, the alvine discharges generally acquire a dark, very offensive, and acrid character. The digestive powers become so enfeebled that almost every thing taken into the stomach passes through the bowels in an imperfectly digested state. Aphthæ finally appear on the tongue and inside of the cheeks; the face acquires a bloated or œdematous appearance; the abdomen becomes tumid and tympanitic; the parts about the anus are excoriated by the acrid discharges, and toward the fatal conclusion spots of effused blood under the cuticle sometimes appear on various parts of the body, more especially on those upon which the patient lies. The little patient at last lies in a comatose and insensible state, with the eyelids half open, and the eye turned up so as completely to hide the cornea.”*

This admirable description of Dr. Eberle at once points out the similarity and also the dissimilarity between the symptoms and course of cholera in infants and in adults; but there are one or two other symptoms, pointed out by Dewees, which are worthy of notice. One of them is a “crystalline eruption upon the chest, of an immensity of watery vesicles, of a very minute size. The best idea we can convey of the appearance of this eruption is to imagine a vast collection of vesicles apparently produced by flitting an equal number of very minute drops or particles of boiling water, and each particle producing its vesicle.”† Dr. Physic, Dr. Rush, and Dr. Condie, have witnessed examples of this eruption, but it appears to have escaped Dr. Eberle. Dewees considers it an invariably fatal symptom, but Dr. Condie says that he has “in many instances known the patient to recover, even when this eruption has been the most extensive and distinct.” It may,

* Eberle on Diseases of Children, p. 238. I may just observe upon this last symptom, which, with the half opened eyelid, gives such a distressing look to the child, that any one who has watched a baby go to sleep, or even carefully traced their own physical sensations during the initiatory part of this process, must have observed that the turning up of the eyeball is almost invariable; that in fact, it is one of the natural and healthy phenomena of sleep.

† Diseases of Children, p. 417.

however, "readily escape observation, if not looked for; it requires that the surface in which it has spread itself should be placed between the eye and the light, and viewed nearly horizontally." "There is another symptom," Dr. Dewees adds, "which attends the last stage of this complaint, which is much more common but not less fatal, which is, the thrusting of the fingers, nay, almost the hand, into the back part of the mouth, as if desirous of removing something from the throat. The popular opinion is, that there is a worm irritating the back part of the fauces. And we may mention another which we do not remember to have seen noticed, which is, the escape of a live worm or worms in the chronic stage of this affection. If the worm come away dead, there is nothing in the circumstance; but if alive, it is a fatal sign."

The duration of this disease varies very much, sometimes terminating fatally in five or six hours, in other cases running on for many weeks. Children sometimes recover from the most hopeless condition, and in all such cases bilious matter reappears in the stools; and always when this occurs, together with warm moisture of the skin, and a better pulse, we may hope for a favorable issue. But when the pulse is weak and thready, and the evacuations watery and colorless, or reddish and mixed with flocculi of mucus, with uneasiness and restlessness, or stupor and insensibility, we may fear the worst.

ENTERITIS.—At the commencement of a bowel complaint, it is by no means easy to decide whether it be an ordinary case of diarrhœa, or whether there may not be inflammation of the mucous membrane of the intestine, as the symptoms are much alike. Even at a later period the distinction is not very marked; nor is the difficulty lessened by the fact that when the diarrhœa has continued for some time as a functional disturbance, it is very liable to degenerate into enteritis or entero-colitis.

Enteritis may commence, then, with moderate diarrhœa, which does not interfere with the child's comfort or its amusement for six or seven days, at which time there supervenes pain in the belly, fever, thirst, loss of appetite, and increase of the diarrhœa. Or the attack may be more sudden, with headache, vomiting, diarrhœa, pain in the bowels, fever, thirst, and loss of appetite. Or, as I have seen in young infants, and verified by *post-mortem* examination, it may present at first neither pain, vomiting, purging, nor tenderness, but merely profound collapse. Other symptoms, as pain, diarrhœa, may subsequently be developed, but it is important to bear in mind that infants may die of enteritis with but little pain, and with no vomiting, purging, or tenderness, but in them the vital collapse is most marked.

The ordinary symptoms, then, are vomiting, diarrhœa, heat, and distension of the abdomen from flatulence, and tenderness on pressure. The amount often varies; it is seldom very intense with young chil-

dren. The tongue is found generally moist, red at the end, and along the edges; there is a disagreeable taste in the mouth, and the breath is offensive. The thirst is great, and the appetite lost. The vomiting continues for some days, and then subsides. The diarrhœa generally continues throughout the complaint, but in some cases it ceases as the disease advances. The abdomen is distended, and is painful when pressed; rarely at the epigastrium, according to Rilliet and Barthez, but rather in the umbilical region or iliac fossæ. The temperature of the abdomen is increased in proportion to the intensity of the inflammation, and is greatest when the disease is at its height.

The color, consistence, and odour of the discharges vary much, nor do I believe that any very important inferences are deducible therefrom. They are sometimes green, sometimes yellow or reddish, brown, or clay-colored. Rilliet and Barthez give the following as the constituents of the stools, the varying proportions of which will influence the consistence and color: 1. The residue of the food, incompletely digested. 2. A secretion of serosity, which is not always present. 3. Mucus, which is almost always present, enveloping the more solid portions; it is variously colored by the bile, is soft and gelatinous. 4. Bile, which colors the stools, and, alone or mixed with mucus, forms the clear or green flocculi. 5. Pus, the presence of which it is difficult to ascertain, unless the fæcal matter be somewhat solid, upon which it then appears as streaks or lines. 6. False membranes, or their *debris*, are occasionally detected. 7. Blood, not fluid, nor occurring as hemorrhage, but mixed with fæcal matter, in striæ, brownish or bright red, or sanious, from mixture with mucus or pus. M. Billard mentions, that in four cases he found an exhalation of blood from the mucous membrane in erythematous enteritis. The evacuations are almost always voluntary, and passed consciously except towards the termination of the disease; but in some cases the urgency is so sudden and so great that the child has not time to call for assistance, and has, therefore, erroneously been supposed to have involuntary motions.

As the disease advances, the skin becomes dry, pale, yellowish; the face wrinkled, old-looking, and expressive of depression and distress; the debility and the emaciation are very great. M. Jadelot lays great stress upon the lineaments of the face. "One of the most certain marks of abdominal affection is the first general lineament, which extends from the commissure of the lips to the lower part of the face, where it loses itself; the second, the nasal lineament, extends from the inside of the alæ of the nose, and surrounds the whole of the orbicularis oris muscle. These are not to be always seen in very young infants, yet some trace of them may be observed, as a fold, on the commissure of the lips, or outside of the orbicular muscle, corresponding with the nasal lineament. When the child suffers violent pain,

there is a corrugation of the skin of the forehead ; and indeed the sudden appearance of wrinkles in any part of the face almost always indicates the presence of abdominal pain, and demands the attention of the physician, for they are invariably marks of distress not to be overlooked. A pinched expression of face, without the presence of any particular lineament, in very young infants, is always a sign of gastrointestinal inflammation."

CHRONIC DIARRHŒA.—Functional disturbance of the bowels, if not fatal, may subside into a chronic form of diarrhœa ; acute enteritis may also be succeeded by the chronic phase of the disease, and the similarity between these chronic disorders is even greater than between the acute forms. The bowels continue relaxed, with a considerable variation in the character, quantity, color, and consistence of the discharges, occasional griping pain, tympanitic inflammation of the abdomen, great general emaciation, loss of appetite, thirst, foul tongue, &c. The fever assumes a kind of remittent type, but is never very intense; the pulse is rather quicker than natural, but weak. The surface is dry, and becomes of a dirty color. Dr. Dewees has included "weaning brash" in his description of chronic diarrhœa, and in some instances it may fairly be so denominated, but it is generally more acute, and the irritation involves the stomach as well as the intestinal canal.

Let us now briefly notice the *complications* of this intestinal disorder, or those secondary affections which are most apt to occur in its course.

1. We found, when treating of muguet, aphthæ, ulceration of the gums, cancrum oris, pseudo-membranous pharyngitis, &c. that in a great proportion of cases they were secondary to an inflammatory affection of the intestinal canal ; and every day's experience shows us that at least the milder forms may occur in the course of acute or chronic diarrhœa, where no decided evidences of actual inflammation are present.

2. Children suffering from any of the varieties of diarrhœa, from cholera infantum, or from enteritis, are very liable to affections of the nervous system, and this either at the commencement, or after the primary disorder has continued some time. In the first, we find the diarrhœa set in furiously with high fever, heat of skin, quick pulse, &c., and then a convulsion partial or general. In the latter case, and by far the more frequent, the convulsion is generally preceded by sleepiness, starting, wildness of eye, stupor, or coma; the cerebral irritation advances more slowly, but is even more to be feared. A *post-mortem* examination does not necessarily afford evidences of meningitis, but yet the complication requires a modification of similar treatment, and will prove equally fatal if the remedies be not early and skilfully applied.

3. Dr. Stewart states that there are many marks of irritation in

the pulmonary system; but my experience would rather confirm the observations of Rilliet and Barthez, that this is a comparatively rare complication. No doubt a child suffering from diarrhœa will occasionally have a short cough, but I do not think that we often see bronchitis well marked in such cases.

Morbid Anatomy.—1. So long as the *diarrhœa* is not inflammatory, a *post-mortem* examination will reveal but few changes beyond the presence of the peculiar secretion in the intestines. Out of twenty-eight cases, M. Legendre observed four in which there was not the slightest change in the mucous membrane, although the disease had lasted from three weeks to four months. He considers that the morbid conditions which are found are the consequences of the prolonged secretion.* M. Billard has discovered enlarged muciparous follicles, but not inflamed, in children dying from excessive serous discharges; and this I believe is nearly all the positive alteration observed, unless the disease run on into inflammation. Most of the morbid appearances recorded as having been noticed in cases of diarrhœa, were the result of inflammation, and prove the cases not to have been mere irritation, or to have transcended those limits. We shall presently enumerate them. Dr. West has quoted in a note the experience of Messrs. Friedleben and Fleisch, from the “*Zeitschrift für Rationelle Medicin*,” vol. v. 1846: “Their observations are founded on fifteen infants, all of whom were under one year old, who were brought up either exclusively, or in a great measure, on artificial food, and who died, after long-continued illness, in a state of atrophy; or else sank rapidly under profuse watery diarrhœa. In cases of the former class, a state regarded by the writers as the result of chronic inflammation of Peyer’s glands, were the chief morbid appearances; while in those instances where death took place rapidly, a swollen and congested condition of the same bodies, betokening, as they believe, their recent inflammation, was almost always present. They found, too, that in all these cases the disease of the colon was comparatively slight, and was evidently secondary to the more serious changes in the small intestine.”† M. Legendre alone, I believe, has noticed the fatty degeneration of the liver in prolonged diarrhœa. The organ is not increased in size, nor is its specific gravity diminished, but its color is mottled with yellow patches‡.

2. In cases of *cholera infantum*, the liver is almost always engorged, and generally greatly enlarged. Dr. Dewees speaks of its occupying two-fifths, Dr. Lindley§ one-half, and Dr. Horner|| two-thirds of the

* Recherches, &c. sur quelques Mal. de l’Enfance, p. 307.

† Diseases of Infancy and Childhood, p. 395, *note*.

‡ Recherches sur quelques Mal. de l’Enfance, p. 376.

§ American Journal of Medical Science, vol. xxiv. p. 305.

|| Ibid. for February, 1829.

abdominal cavity. It is firmer and more solid than natural, but without perceptible change of structure. There are abundant evidences of inflammation in the stomach and small intestines; red, inflamed patches, inclining to purple, may be observed, especially in the duodenum; nor are they limited to the small intestines, as Drs. Jackson and Dewees thought, Dr. Horner and others having found them in large intestines. Dr. Horner has added another pathological characteristic to those observed before; he has shown that very extensive inflammation of the mucous follicles of all the intestines is present, in this agreeing with the observations of MM. Billard, Roederer, and Wagler.

3. The morbid changes discovered in the mucous membrane of the small intestines in *enteritis* are very similar to those we noticed in the stomach. Redness, partial or general, occasionally limited to a small portion of the intestine, with or without ramollissement. This erythematous inflammation is the most common; pseudo-membranous enteritis is more rare, and is seated at the lower portion of the intestine. Simple ulceration is comparatively rare; most commonly the ulceration is follicular. But here again we meet with inflammation of the follicles and of the groups of glands. The isolated follicles are prominent, rounded, and giving to the finger the sensation of a grain, somewhat soft, about the size of a pin's head ordinarily, and occasionally somewhat larger. They are more voluminous in the upper than the lower portion, paler and more transparent than the rest of the mucous membrane, they are sometimes surrounded by a red circle. When punctured, there escapes a drop of serous fluid. The glands of Peyer are frequently inflamed, and become swollen and thickened, and are easily removed by scraping with the scalpel. Their surface may have a mammelonated appearance, or be equally developed and prominent; red, or of a rose colour; smooth, with a number of depressed points, the orifices of the mucous follicles.

Dr. West thus sums up the alterations he has observed in the small intestines: "They consist in a more or less intense redness of the mucous membrane, which appears thickened, and presents something of a velvety appearance, shaded over with numerous dark spots, the orifices of the solitary glands. In other instances, the surface of the reddened mucous membrane appears slightly roughened, as if sprinkled over with fine sand; while near to the cæcum the roughening is often greater, the membrane appearing elevated into rough, orange-colored prominences, separated by narrow lines, of a dead white color, which mark the situations where, by the destruction of the mucous membrane, the subjacent tissue is exposed." "Besides this affection of the mucous membrae of the ilium, Peyer's glands are not unfrequently very well marked in the lower part of the small intestine; and their surface presents a punctated appearance, due to the unusual distinctness of the orifices of the sacculi which compose each gland. Occasionally a few of them are congested and swollen, and once or twice I have

observed one or two spots of ulceration on that cluster of Peyer's glands which is situated close to the ileo-cæcal valve ; but in every instance the affection of the small intestine has appeared to be secondary and quite subsidiary to the disease in the colon."*

The mesenteric glands are most frequently unaffected ; sometimes they have been observed to be increased in size and congested, but in general they retain their normal appearance and size. Softening of the mucous membrane is extremely common in infants, either limited in extent or extending throughout the intestine.

In some rare cases, traces of cerebral congestion, or of disease of the membranes of the brain are discoverable, but in general, even when head symptoms have occurred, but little information is obtained by a *post-mortem* examination.

The lungs are almost invariably healthy, and the mucous membrane free from inflammation, quite justifying the remark I made as to the rarity of such complication with diarrhœa.

Causes.—All the varieties of irritation and inflammation of the intestinal canal are as common with infants as with older children. I do not think we can say more common, although the delicate unused condition of the mucous membrane might well predispose them to it. The chief causes of diarrhœa are, cold, damp, improper food, or excess of proper food, dentition, and variations of atmospheric temperature.

On a comparison of the results of five years' observation at the Children's Infirmary, Dr. West found that in the three months,

Nov. Dec. and Jan. diarrhœa formed	7.2	per cent. of all cases of diseases.
Feb. March, and April, . . .	8.3	„ „
May, June, and July, . . .	13.0	„ „
August, Sept. and Oct. . . .	24.4	„ „

Dr. Condie very truly remarks that food, which is ordinarily suitable, will sometimes disagree with the same children, and give rise to diarrhœa ; and during infancy, of course, the babe will be affected by any change in the nurse's milk, whether the result of bodily or mental conditions.

The loose discharges about the period of dentition, appear connected with the enlargement and inflammation of the mucous follicles, as Billard has observed ; and M. Bouchut found that only twenty-six out of 110 actually escaped at this age, whilst forty-six suffered very severely. Mucous diarrhœa occasionally follows the suppression of cutaneous eruptions, or the drying up of sore ears.

Cholera infantum seems limited by age, few cases occurring beyond the second, and never beyond the fifth year. " During twenty years, the deaths from cholera infantum in Philadelphia amounted to 3,576 ; namely, in infants under one year of age, 2,122 ; between one and

* Diseases of Infancy and Childhood, p. 394.

two years, 1,186; between two and five years of age, 268." "The influence of a high atmospheric temperature in the production of cholera infantum is shown by the fact, that its prevalence is always in proportion to the heat of the summer, increasing and becoming more fatal with the rise of the thermometer, and declining with the first appearance of cool weather in autumn. A few hot days in succession in the month of May are sufficient to produce it; while in the height of its prevalence, a short period of cool weather will diminish, if not entirely suppress it."* But heat alone is not sufficient; it requires in addition confined and impure air, for we find that the disease is nearly confined to large cities—that little or none is seen in the country, although the heat is quite as intense. Infants who have been prematurely weaned, and children whose diet is bad or in excess, are extremely obnoxious to an attack, and probably the irritation of dentition may be among the predisposing causes.

The causes of *enteritis* are almost identical with those of diarrhœa. Unwholesome food, irritating matters, excess, dentition, cold, impure air, &c., are as likely to give rise to the severer as to the milder affection.

But we must not forget that diarrhœa, whether functional or organic, may in any or all of its varieties be a secondary affection, and that this may either be the result of the primary disease, or of the remedies employed in its cure. Thus we find that in the course of the eruptive fevers, meningitis, bronchitis, pneumonia, &c., diarrhœa is very apt to set in, and especially when these have been treated by calomel, tartar emetic, or purgatives. The symptoms do not differ materially from those already enumerated, although they are more or less masked by the predominance of the primary disorder. We find diarrhœa, pain, and perhaps some degree of tenderness, tympanitic swelling, and tension of the abdomen, which may subside, all but the diarrhœa; the tongue is moist, red at the point and edges, the face becomes pale and wrinkled, with the nasolabial trait well marked, the eyes are hollow, &c.; and this condition may continue until either the primary disease is cured or proves fatal. Or the attack may come on more suddenly and more severely in the course of an acute disease, with excessive vomiting, copious diarrhœa, tension and enlargement of the abdomen, with a disproportionate degree of tenderness (so as almost to lead us to suspect peritonitis), great exhaustion, &c.

Diagnosis.—1. The distinction between diarrhœa from excessive secretion, and that which is the result of enteritis, is by no means easy, not only from the similiarity of symptoms and course, but also because the former is very apt to run on into the latter. The most characteristic difference is the amount of fever, the pain, and the tenderness on pressure, which are much more marked in the latter.

* Condie on Diseases of Children, p. 215.

2. On the other hand there is less acute tenderness, less pain and fever, in enteritis than in peritonitis; the expression of countenance is different also.

3. The previous history will almost always show that the head symptoms are secondary, and that, therefore, we are not called upon to treat simple meningitis. The previous, and in most cases the prolonged diarrhœa, and the gradual development of nervous symptoms, are very unlike the course of the disease when primary.

Prognosis.—1. In simple diarrhœa, if we see the case early, our prognosis will upon the whole be favorable; but if the disease be of longer standing, and have resisted the ordinary means of relief, we cannot conceal from ourselves that considerable danger attends the complaint. A cessation of vomiting, a decrease of the purging, subsidence of the abdomen, and the return of appetite, constitute the favorable symptoms, while an increase of these symptoms with higher fever, or sinking, or the accession of any complication, especially of the head, will leave but little hope. It is scarcely possible to have a more fatal complication than a cerebral attack towards the termination of an exhausting diarrhœa.

2. The same observations will apply to moderate cases of enteritis. In severe cases, the prognosis is more unfavorable, and the chances of some fatal complication greater.

3. Cholera infantum is a most fatal disease; a very large proportion of children are carried off by it.

Treatment.—The first duty is to remove every possible cause of the disease. If we have any reason to suppose that the nurse's milk does not agree with the child, it will be necessary to change the nurse; and it will be well to choose one whose child is rather older than our patient, as the younger the milk the more likely it is to purge the infant.

If the child be weaned, we must correct any errors of diet, either as to quantity or quality, and, as a general rule, substitute a bland, milky, or farinaceous diet for any kind of animal food. Ass's milk for young children, arrowroot, tapioca, panada, &c., are all very wholesome in irritations of the intestinal canal.

If the teeth be at all at or near the surface, or even when at some distance, if the child suffer from irritation of the gums, they ought to be freely divided down to the teeth, and rather beyond the limits of those coming to the surface. Very often the irritation which a child would bear in health without any inconvenience will be quite sufficient to neutralize the effect of our remedies when diarrhœa is present.

These points being attended to, we have next to consider what medicines we shall employ, and, on the supposition that irritating matters require to be removed, many physicians commence with a purgative of rhubarb, magnesia, or castor oil. Undoubtedly, if such matters were in the intestinal canal, this would be right, but disordered evacuations are no proof of it; and I very much prefer calming the

irritation first, and then, if necessary, clearing out the bowels. For this purpose, nothing is better than the chalk mixture with some aromatic and a drop or two of laudanum to the ounce. I find that small divided doses answer just as well as larger ones; and I prefer laudanum to syrup of poppies, because, if fermentation take place with the latter, the acetate of morphia is formed, and the child may get an overdose. Mucilage, syrup, sal volatile, aniseed water, with the same amount of laudanum, will answer equally well, with the advantage of being slightly stimulant. Or the hyd. c. cretâ may be combined with the pulv. cretæ c. opio, or with Dover's powder, in proportions according to the age of the child. A starch enema, containing a few drops of laudanum, will often relieve the irritation quicker than anything else, and, given at bed time, will secure a good night's rest. It may be repeated as often as necessary. If the discharges be acid, we may combine an alkali with the foregoing.

I have found great advantages in obstinate cases from the use of external irritation, either by mustard and meal poultices, or the compound camphor liniment with landanum. A plain poultice applied twice a day affords great comfort, or the abdomen may be fomented.

If the discharges continue and are still excessive, a more decided astringent may be given; the infusion of catechu, or decoction of logwood, or the tincture of kino; or catechu may be added to the chalk mixture, or a mixture with acetate of lead and a few drops of laudanum.

Dr. West speaks most highly of the extract of logwood and tincture of catechu, five grains of the former and ten minims of the latter, to be given three times a day, in some sweetened aromatic water, to an infant a year old.

"Pure argil has been of late much used in diarrhoea accompanied with acidity, as it forms with the acids an astringent salt. The substance is prepared from the sulphate of ammonia and alumina, by exposing it to a strong red heat in a crucible. Argil in the form of a white powder possesses great astringent powers. Riecke recommends the formulæ which are subjoined."

R.—Emuls. sem. papav, ʒiijss.

Argillæ puræ, ʒij.

Syr. althææ, ʒss.—M.

A teaspoonful for a child two years old.

R.—Argill. puræ, ʒss.

Gum. Arab. ʒj.

Sacch. alb. ʒij.

Aquæ fœniculi, ʒiij.—M.

A teaspoonful for a child a year old.

The foregoing treatment seems so far suitable to any of the varieties

of diarrhœa; but some modifications have been suggested in the different species. In *mucous* diarrhœa, we are advised to endeavour to restore the action of the skin as well as to restrain the discharge, and for this purpose ipecacuanha has been recommended by Good, Dewees, Stewart, Condie, &c. Dr. Good gives it alone or united with opium, Dr. Stewart alone or with cretaceous preparations, and Dr. Condie combines it with calomel, acetate of lead, and hyoscyamus. As an astringent, Dr. Stewart speaks highly of an infusion of the root of the geranium maculatum, half an ounce to a pint, and also an infusion of the bark of the *rubus villosus*, or common blackberry. To an infant of six months, a teaspoonful may be given five or six times a day, and a tablespoonful to a child of two or three years. Dr. Eberle recommends a few drops of the balsam copaiba in emulsion when mucous diarrhœa is somewhat chronic; and Dr. Condie has found it very useful.

In *bilious* diarrhœa we are advised first to clean out the bowels, and then to give small doses of calomel with laudanum, or the hyd. c. cretâ with Dover's powder. Dewees recommends the tartrate of antimony in small doses, but I confess I should be very unwilling to give it, lest it should increase the gastric irritation, or perhaps give rise to gastritis. M. Trousseau recommends the neutral salts, ipecacuanha, and, if there be much mucous disturbance, opium.* The child should be removed to a cool atmosphere, have a tepid or warm bath daily, and drink plentifully of gum water, rice water, &c., and be supported by a bland farinaceous diet.

In *chylous* diarrhœa Dr. Dewees advises low diet, rennet whey, or gum water, anodyne injections at night, and minute doses of calomel during the day—"say a quarter grain every four hours, with the twentieth of a grain of opium." "We have thought we derived advantage from the application of a blister to the back of the neck, and keeping the body unusually warm."†

Very much the same kind of treatment is recommended for *lienteric* diarrhœa; abstinence from much food, and that given to be milky or farinaceous; frictions to the abdomen, chalybeate water, with a minute dose of laudanum, fresh pure air, &c. Dr. Dewees ordered friction with tartar emetic ointment; but for reasons before stated, I very much prefer compound camphor liniment, or a mustard and meal poultice, or a blister. M. Trousseau states that the stools are acid, and to correct this he gives either magnesia, from one to five grains daily; lime-water, one scruple to one drachm; or the bicarbonate of soda from two to eight grains. In addition he advises mineral baths, containing from two to six ounces of sulphate of iron, sulphurous or aromatic baths, with deco-

* Ranking's Abstract, vol. iv. p. 202.

† Diseases of Children, p. 391.

tions of sage, lavender, or rosemary, a pint of red wine, and common salt; fresh air and sunshine.

In *cholera infantum* the great desideratum is to tranquillize the stomach; until that is done not only is the disease unchecked, but the suitable remedies cannot be exhibited. For this purpose Dewees recommends warm water to "encourage the puking," and enemata of warm water to clear the bowels. This appears to me to be acting upon the supposition that there is some irritating matter still in the stomach and bowels; and, with all respect to Dr. Dewees and others who have advocated the same plan, I believe it to be an error, or at all events an assumption of which we have no proofs. That discharges are foul and acrid does not prove that they cause the evacuations; it only proves that such discharges have their origin in disordered action or secretion, and it is to that our attention should be directed.

Calomel in small doses rubbed up with sugar; or the hyd. c. cretâ with Dover's powder, or small quantities of laudanum in a mixture, may be given with very good effects. Anodyne injections, warm baths, warm and stimulating frictions to the extremities, with stimulants internally, if there be much threatening of collapse, must all be tried. A blister over the stomach will often arrest the vomiting. "When the vomiting persists, we have found a few drops of spirits of turpentine, or of a solution of camphor in sulphuric ether, repeated at short intervals, seldom fail in removing it. When the vomiting is violent and frequent the application of a few leeches to the epigastrium will be found decidedly advantageous. When everything else fails we have very seldom been disappointed in removing irritability of the stomach by the administration of the acetate of lead in solution." Dr. Eberle recommends the plan first adopted by Dr. Parrish, of blistering behind the ears in cholera, and the administration of small doses of calomel and ipecacuanha, and a stimulating poultice over the abdomen.

If we suspect the existence of acid in the stomach and bowels we may combine chalk with the calomel, or we may adopt Dr. Kuhn's plan of giving magnesia with ammonia. Dr. Condie gives Kuhn's formula as follows:

R.—Magn. calcin. $\mathfrak{D}\text{iv}$.
 Pulv. g. Arab. $\mathfrak{D}\text{j}$.
 Sacch. alb. $\mathfrak{z}\text{ij}$.
 Aq. menth. pip. $\mathfrak{z}\text{ss}$.
 Aquæ font. $\mathfrak{z}\text{ijss}$.
 Aquæ ammon. pur. gtt. xlviij. to gtt. clxiv.,
 according to the age of the child.

The dose is a teaspoonful every two hours.

When the stomach is quieted we may have recourse to any of the remedies already mentioned, to restrain the action of the bowels; of these, probably, the acetate of lead and opium, or gallic acid and opium,

in small doses, proportionate to the age of the child, will be found the best; and when these watery discharges are diminished or changed for those containing succulent or bilious matters, the treatment will then be the same as for diarrhœa.

When cholera infantum becomes more chronic we may have recourse to warm baths, frictions or blisters to the abdomen, anodyne injections, astringents, and a slight improvement in the diet. Some of the preparations of iron may be tried. Eberle speaks highly of the tartrate, others of the persesquinitrate of iron. Sulphate of quinine is also very useful occasionally. Dr. Condie recommends powdered charcoal in conjunction with rhubarb, ipecacuanha, and hyoseyamus, when the discharges are acrid, offensive, and dark colored. In addition, as the disease appears to be produced by hot, impure air, and deficient ventilation, the child ought to be removed to a cooler and purer atmosphere; and, as the stomach will bear it, the diet must be improved in quality, and stimulants given in due proportion to the age and circumstances of the child.

The treatment of *enteritis* differs but little from that of gastritis detailed in the last chapter, except that, when it has been preceded by exhausting diarrhœa, we must be cautious not to push antiphlogistic remedies too far. If the pulse be pretty good, and the prostration not too great, we may apply leeches to the epigastrium, in number according to the age and strength of the infant, intensity of the disease, &c; and the bleeding should be stopped immediately, unless we superintend the operation ourselves, as Maunsell and Evanson suggest. It is easy to repeat the leeching, if necessary, but far from easy to remedy excessive loss of blood. Warm baths, when the child is not too weak, and fomentations to the abdomen, are most valuable; or, what is less troublesome, a succession of nice, warm, soft poultices. I do not think the profession in these countries are fully aware of the great value of poultices in internal and deep-seated inflammation. Nothing can be more marked than the relief afforded, and their soothing effect upon children. Some degree of counter-irritation may also be necessary, either by means of mustard poultices, liniments, or blisters. Sinapisms or even blisters may be applied to the extremities with benefit.

Internally calomel or gray powder will be very useful, if it can be given without increasing the irritation; and if not, we may either use mercurial inunction, or dress the blister with mercurial ointment. Opium alone, or in combination with the above, or in the form of laudanum, pulv. cretæ cum opio, or Dover's powder, will afford relief from the pain and gastric irritability, and will render tolerable other remedies. The diarrhœa may generally be arrested by some of the astringent remedies mentioned already—chalk, lead, kino, catechu, gallic acid, &c.; and the diet must be carefully regulated. It is not a prime object to accumulate nourishment; if this be given too soon the disease will rather be increased. Mucilaginous drinks, or milk, with very light, thin, farinaceous food, appear to be the most suitable; and

when the disease is on the decline, then we may gradually give more nourishment, and wine if necessary. Of course every possible exciting cause must be removed, and the gums lanced, if required.

Chronic diarrhœa requires a slight modification of the treatment already laid down. In addition to the calomel, chalk, ipecacuanha and hyoscyamus, recommended by Dr. Condie, the acetate of lead, with or without laudanum, the vegetable astringents, &c., we are advised to try spirits of turpentine, balsam copaiba, the persesquinitrate of iron in doses of two or three drops of the *liquor* every two or three hours, in sugar and water, &c.

One of the occasional symptoms I have already noticed, the prolapsus ani, demands a word as to its treatment. So far as it depends upon relaxation resulting from frequent discharges, the relief of the diarrhœa will cure it at the same time; but it does often remain, because of the habit of sitting long at stool and forcing, which the child acquires during the course of the disease. Now, in order to remedy this effectually, all we have to do is to place a board, with a small perforation, across the chair or vessel the child uses, and to place the latter so that the child cannot touch the ground with its feet. So circumstanced, no excessive forcing can be used, and I have repeatedly found the plan successful. I am indebted for the suggestion to my friend Dr. Corrigan. It will rarely, if ever, be necessary to have recourse to any surgical operation for its cure. If it persist, a little gall ointment, or a small astringent injection occasionally will almost always be sufficient. I need hardly say that the gut is to be returned immediately each time it prolapses, by applying gentle pressure with one or two fingers, previously oiled.

Another very troublesome occurrence, as Dr. West has remarked, is the intertrigo occasioned by the contact of acrid fæces. Generally this results from want of due cleanliness, but I have seen it in children with an irritable skin in spite of the utmost care and watchfulness. The best remedy is careful sponging after each evacuation, and anointing the parts, when dried, with zinc ointment, zinc cream, or ointment of the acetate of lead. Dusting the neighbouring parts with lapis calaminaris or lycopodium is also of great use in protecting them.

As regards the complications I need not say much, having already treated very fully of them; and I must refer the reader to the chapter on diseases of the mouth and pharynx. But I wish to impress most forcibly upon all, the importance of carefully watching for the first inroads of cerebral complication, and of promptly applying the very few suitable remedies at our command. It is not often that we can venture to apply leeches under these circumstances; if the case will admit of it of course it should be done; but if not, we must have recourse to counter-irritation to the scalp or to the extremities, and to calomel, if the stomach and bowels will bear it, or to mercurial inunction or dressings. Notwithstanding the head symptoms, we are not to abstain from opiates, if the state of the bowels requires it, because

the continuance of that irritation will be far more injurious to the brain than the small quantities of laudanum I have recommended.

Again, the head symptoms show themselves very often at the time when the constitution of the child has been so much weakened as to require wine or other stimulants; and, although these are somewhat counter-indicated by the attack of the nervous system, I have found the child suffer more by their omission than by their continuance. I recommend, therefore, that they should be continued, but with caution and watchfulness.

Secondary diarrhœa, with or without enteritis, requires no other modification of the treatment here specified, than what results from the coincident treatment of the primary malady, and the state of constitution induced by it.

The diet I have mentioned should in every variety be bland, milky, and farinaceous; very moderate also in quantity, and repeated at distant intervals, so as not to give the stomach too much to do at once. Fresh, pure air, and a change from town to the country, is of great value. Warm baths, to cleanse the skin and promote its functions, absolute cleanliness, and suitable warm clothing, are quite necessary. I have seen most beneficial effects in chronic diarrhœa from a swathe of new flannel being worn round the abdomen next to the skin.

CHAPTER XVII.

DYSENTERY. COLITIS.

IN the last chapter I mentioned that inflammation of the small intestines was frequently accompanied by inflammation of the large intestines, constituting the entero-colitis of the French authors; nay more, that this compound affection was of more frequent occurrence than either element separately; and some evidence of the morbid lesions was brought forward under the head of morbid anatomy. Rilliet and Barthez have given a table of these diseases, and of their conjunction numerically, and I shall quote it in the hope of impressing upon my junior readers the difference between a written description of disease and clinical experience; how what is very clear and definite in the one,

is obscured by combinations and modifications in the other which yet cannot be described on paper; and how necessary it is in practice to bear in mind the relations of one disease to another, as well as the characters of each disease.

The authors I have named met with forty-five cases of enteritis, and 113 cases of colitis, either erythematous, pseudo-membranous, ulcerous, or pustulous; ninety cases of follicular enteritis; sixty-four cases of follicular colitis; twenty-eight cases of softening of the small intestines; and thirty-five cases of softening of the large intestines; and these, occurring in 185 cases, were thus associated:

Enteritis alone, in	2 cases.
Colitis alone	32 "
Entero-colitis alone	11 "
Follicular enteritis alone	12 "
Follicular colitis alone	3 "
Follicular entero-colitis alone	10 "
Enteritis and follicular enteritis	8 "
Colitis and follicular colitis	12 "
Enteritis and follicular entero-colitis	2 "
Colitis and follicular enteritis	17 "
Colitis and follicular entero-colitis	11 "
Entero-colitis and follicular enteritis	7 "
Entero-colitis and follicular colitis	4 "
Entero-colitis and follicular entero-colitis	7 "
Softening of the large intestines	8 "
Softening of the small and large intestines	10 "
Enteritis and softening of the large intestines	1 case.
Colitis and softening of the small intestines	2 cases.
Colitis and softening of the large intestines	1 case.
Enteritis, colitis, and softening of the large intestines	2 cases.
Softening of the small intestines and follicular enteritis	1 case.
Softening of the large intestines and follicular colitis	1 "
Softening of the small intestines and follicular colitis	1 "
Softening of the small intestines and follicular entero-colitis	1 "
Softening of the large intestines and follicular enteritis	3 cases.
Softening of the large intestines and follicular entero-colitis	1 case.
Softening of the small and large intestines and follicular enteritis	2 cases.
Softening of the small and large intestines and follicular colitis	2 "
Softening of the small and large intestines and follicular entero-colitis	3 "
Colitis, softening of the small intestines, and follicular enteritis	1 case.
Colitis, softening of the small intestines and follicular colitis	3 cases.
Colitis, softening of the small intestines and follicular entero-colitis	3 cases.
Entero-colitis, softening of the large intestines, and follicular enteritis*	1 case.

From this minute tabular view, it is evident that no arrangement or division of these affections can be based on morbid anatomy; for

* Mal. des Enfants, vol. i. p. 488.

we find in a great number of cases that lesions of the large and small intestines are more frequently conjoined than separate; and that, therefore, in making a distinction, we must rather be guided by the history and symptoms of the disease than by the result of *post-mortem* examination. So far, however, this distinction is borne out, that we do, in fact, find, in a certain number of cases, that the disease of the small and large intestines existed separately, and that the latter cases were much more frequent than the former.

Without any wish, therefore, to make a clearer distinction than we find at the bed side, I have still thought it well to treat the irritation and inflammation of the small intestines separately in the last chapter; and to complete the history of this complicated affection of the digestive tube, by treating of colitis, or, as it is usually termed dysentery, in the present chapter; first, repeating that, as in the former disorder, when disease of the small intestines predominated, we found that the large intestines participated, to a certain extent; so in the present disease of the large intestines, we shall find that the small intestines are by no means in a state of integrity.

DYSENTERY then, consists in an inflammation of the large intestines chiefly, and may occur in children of any age; although it appears to be less frequent in infants than in older children. It may present itself in either an acute or chronic form, and may be either primary or secondary.

I shall first notice *Acute Primary Colitis*. This may be developed in the course of ordinary enterocolitis by the diminution of the enteritis, and the consequent predominance of the inflammation of the large intestine, and the early symptoms will be those of which I spoke in the last chapter. Or it may commence by uneasiness, broken sleep, irritability, some increase of the regurgitation of milk, and diarrhoea of feculent matter. So far the attack appears one of simple diarrhoea, without fever, and with the mouth cool and moist.

After a few days, however, the disease changes its character a good deal, the evacuations become more frequent, smaller, and with less feculent matter, until they consist of little more than small quantities of mucus mixed with blood, or even of blood chiefly. They are preceded by pain and followed by tenesmus; indeed, it is difficult to induce the child to leave the chair, or to forbear extreme forcing. Occasionally masses of feculent matter are expelled. The abdomen swells, becomes hot, tympanitic, tense, and tender; and there is a corresponding degree of fever, with hot skin, quick pulse, and evening exacerbations. The child rapidly emaciates, his flesh feels flabby and soft, his face distressed and anxious, wrinkled and with a look of age; the eyes are dull, sunk, and with a dark circle around them.

If the disease be not arrested, these symptoms increase. The abdomen becomes more distended, and very tender on pressure; the child complains of severe pain, especially when the bowels are moved; the discharges may preserve their ordinary character, or they may become

dark-colored, acrid, and highly offensive. From the irritating nature, of the evacuations, the anus and surrounding parts become red, hot, painful, and excoriated. M. Bouchut observes, that erythema of the thighs and buttocks exists in five-sixths of the cases of entero-colitis. It commences with the disease, and appears ordinarily some days previously. At first there is simple redness, with reddish papulæ, more or less confluent, on the thighs, scrotum, or vulva, and on the inside of the limbs down to the ankles. The epidermis on these papulæ becomes eroded, and superficial ulcerations, whose red and bleeding surface is on a level with the surrounding skin, are the result. These ulcerations spread and unite until they sometimes form an ulcer of considerable extent, and constitute in themselves a serious disease. These ulcers are gradually covered with a false membrane, which becomes organized and covered with epidermis, as the process of healing makes progress. The erythematous redness which attacks the ankles and heels may also run on into ulceration. These accidents are by no means common in private practice, as M. Trousseau has shown that they are dependent upon a want of cleanliness, more likely to occur in an hospital. Redness and excoriation we do constantly see, however, and with all care it is difficult, if not impossible, to prevent it. At an advanced stage of the disease, we also not unfrequently find aphthous patches around the anus. Prolapse of the gut, also, is by no means uncommon. The fever continues; the pulse is quick; the heat of the surface unequal; the extremities often cold; the thirst considerable; the mouth hot and dry, often attacked by aphthæ, especially at the angles; there is great depression of strength, and extreme emaciation.

Colitis may terminate fatally at an early period, from the intensity of the disease, but more frequently it is protracted for several weeks, and the child sinks from exhaustion: or coma and other cerebral symptoms supervene, and carry off the patient.

The principal complications of dysentery are affections of the mouth, such as muguet, aphthæ, cancrum oris, &c., and cerebral irritation or effusion, just as we found to be the case with diarrhœa and enteritis; and the observations I there made apply equally well to the present disease.

Chronic Dysentery presents nearly the same array of symptoms, but in a minor degree. Frequent discharges of mucus mixed with blood, occasionally fæcal matter; uneasiness and pain in the bowels, tenesmus, more or less tension and tenderness of the abdomen; a dry mouth; thirst, no appetite, aphthæ at the angles of the mouth and about the anus; great prostration, extreme emaciation, &c. We find cases occur as the partially successful result of treatment, or as an effort of the constitution to throw off the disease, but, after remaining in a chronic state for some time, they very frequently prove fatal from exhaustion.

Secondary Dysentery is more frequent in the course of the eruptive fevers, and the characteristic symptoms show themselves from the sixth to the tenth day. There may probably be a diarrhœa for some

days before, and then the discharges become sanguinolent, either black or red, and mixed with mucus. The evacuations are frequent, and accompanied with tenesmus. The abdomen is tense, tender, and generally hot, and the constitutional symptoms very marked,—fever, dry, hot skin, anxious distressed countenance, sunken eyes, &c., but these may, of course, be partly owing to the primary affection. The following is the description of the disease, by M. Constant, in an epidemic which occurred at the Hôpital des Enfants: “The disease ordinarily commenced by abdominal pains, accompanied by borborygmi and frequent desire to evacuate the bowels. The discharges were scanty, passed with great effort, and consisting at first of greenish or yellowish viscid mucus, soon replaced by whitish mucus mixed with blood, and lastly consisting of arterial blood, either pure or mixed with small quantities of stercoral matter, or the remains of membraniform concretions. At the same time there were griping pain, tenesmus, and pain in the rectum and anus; but this latter symptom was wanting in some cases. It was only a short time before death that we witnessed coldness of the extremities, failure of the pulse, and cadaveric expression of the face. In no case was there headache, singing in the ears, stupor, epistaxis, lenticular eruption (maculæ), sudamina, or the sibilant râle in the chest, which so constantly occur in the course of severe fevers. The intellect remained intact until the approach of death. In two cases only the tongue was dry and loaded.”* More than half of the cases referred to by M. Constant died; and all Rilliet and Barthéz’s cases, after an interval of from four to fifteen days from the commencement of the diarrhœa, and from three to ten after the appearance of the dysenteric symptoms.†

Morbid Anatomy.—In all cases there is evidence of inflammation, often very intense, in the large intestines, and often also in the smaller. The mucous membrane is red, swollen, thickened, and of slight consistence, often very much softened, with small ecchymoses here and there. In the great majority of cases the mucous follicles are enlarged, and their orifices widened and ulcerated.

M. Bouchut gives the following result of his observations on young infants: The large intestine was affected throughout in all cases, but the disease was chiefly confined to the mucous membrane. The intestine was ordinarily contracted, as it had been left by the spasm of the muscular coat, and the mucous membrane was of course thrown into a number of folds, the edges of which presented marks of inflammation. The color of the membrane varied from a pale rose to a bright scarlet, interrupted by the enlarged, whitish, prominent mucous crypts, depressed in the centre, and filled by a grayish fluid. At the edges of the folds erosion and ulceration occurred, of an irregular form, super-

* Gazette Médicale, 1836, p. 101.

† Mal. des Enfants, vol. i. p. 530.

ficial and narrow, with red but not raised edges, and a surface of the same color as the surrounding tissue. Ulcerations were also found in the intervals of these folds, small, superficial, and round, hardly to be distinguished except by their inflamed borders, and probably occupying the mucous follicles. In those infants who died quickly the mucous membrane was of a marked thickness; but in cases which were prolonged, with great emaciation, it was very thin, and, in some cases, scarcely discernible. It was generally softened, especially in those cases where the membrane was very red. The mucous follicles were always developed, with their orifices generally dilated or ulcerated. The cellular membrane was somewhat thickened, and slightly harder than usual. The muscular tissue was unchanged. The mesenteric glands were occasionally enlarged, but unaltered in color or texture.*

M. Constant has stated that in all his cases there was false membrane on the surface of the large intestine. In all, the mucous membrane was of a deep red color, thickened, rough, and unequal in its surface, and presenting different degrees of softening.

Dr. Mayne states that he found an undue degree of vascularity of the peritoneum, congestion of the absorbent glands, thickening and induration of the coats of the intestine, the mucous membrane varying in color from a bright red to green or purple, in some cases covered with a bran-like exudation, in others ulcerated. The ulcers were sometimes small and isolated, in others superficial and extensive, and, in a third variety, large, irregular, ragged, and penetrating. The small intestines were generally healthy; the liver was sometimes extremely congested.†

Causes.—I do not know that either age or sex have much influence in the production of the disease; it occurs in both sexes indifferently, and at all ages, especially about the period of dentition. Atmospheric influence, however, is clearly traceable; heat, moisture, and impure air seem to be the three principal elements. Thus we find it more frequent in the latter part of the summer and beginning of winter. The usual exciting causes of diarrhœa will give rise to it; improper food, or an excessive quantity; cold, damp, deficient clothing, dentition, &c. Moreover, in certain localities it is endemic; foundling hospitals, fever houses, the densely populated and badly ventilated parts of towns, &c.

Epidemics of dysentery are by no means unfrequent. I have alluded to the one described by Constant in the *Hôpital des Enfants* in 1835. Dr. Cogswell described one which prevailed in the state of New York.‡ Dr. Mayne has described an epidemic which prevailed in the South

* *Mal. des Nouveaux-nés*, p. 210.

† *Dublin Journal*, May 1844, p. 298.

‡ *New York Med. Repository*, vol. ii. p. 127.

Dublin Union Poorhouse, between April, 1846, and August, 1848, during which 127 male children under ten years were attacked, and seventy-four died. The disease prevailed equally among the female children under Dr. Shannon. In a great many of the cases, the disease occurred as a sequela of measles, proving rapidly fatal.

Dysentery may supervene as a secondary affection upon diseases of the mouth, chronic diseases of the lungs and skin, and especially in the course of measles, scarlatina, and smallpox.

Diagnosis.—The only positive distinction between dysentery and diarrhœa, is the presence in the former of small muco-sanguineous evacuations with severe tenesmus. In general, dysentery is much the more severe, with more suffering and decidedly more fever.

Prognosis.—Even as a primary disease, the prognosis must often be unfavorable, and still more when it supervenes upon a disease which has already exhausted the strength and constitution of the patient; in fact, very few of the latter cases recover. In general it is very obstinate, not amenable to treatment; and unless seen early and treated promptly, it is very apt to wear out the patient, even when not of sufficient intensity to destroy life quickly.

The most favorable symptom is the recurrence of fæcal matter in the stools, the return of appetite, and the disappearance of fever.

Treatment.—Bearing in mind that there are in all cases evidences of inflammation of the large intestines, and that often very severe, we need not hesitate in primary dysentery to apply leeches along the track of the colon, in numbers proportioned to the child's strength and the severity of the attack. Some writers have recommended these applications to the verge of the anus, but Dr. Condie objects to this, on account of the difficulty of stopping the leech-bites occasionally, and I quite agree with him.

In secondary colitis, the condition of the child generally precludes the possibility of applying leeches; but for this, they would be equally suitable. In chronic dysentery, they are rarely necessary.

Bleeding from the arm has been advised when the child is strong, the attack severe, and the fever high; the necessity of the case must, of course, determine its propriety.

After the leeching, nothing will be so comforting as a linseed-meal poultice applied hot, and renewed every hour. Fomentations and warm baths are also very beneficial.

There is considerable difference of opinion as to the use of purgatives, and the time for their administration. No doubt there is generally an accumulation of fæcal matter above the diseased portion of the intestines, which must be evacuated; it is true also that the discharge of the fæcal matter is a first symptom of improvement; but I confess I prefer, as in diarrhœa, quieting the excessive irritation in some degree first, and then administering moderate purgatives at intervals. We may begin, then, by a starch and opium enema, or a mucilagi-

nous or chalk mixture with laudanum, or acetate of lead and opium, or calomel, ipecacuanha, and hyoscyamus, or Dover's powder, in doses proportioned to the age of the child. One-third of a grain of calomel, as much ipecacuanha, and one-twelfth of a grain of opium, may be given every three or four hours, to a child of a year old; but if the stomach be irritable, the ipecacuanha must be omitted.

In the epidemic described by Dr. Mayne, no medicine was so useful as mercury given early, in small doses rather than large ones, and continued until the evacuations exhibited a beneficial change, or until salivation occurred. Next to mercury, alkaline medicines were most useful; the liquor potassæ, or lime-water, with a small quantity of opium were found very soothing. Opium, in full doses, aggravated the disease; purgatives were rarely useful; the bitartrate of potassa in large doses, failed; turpentine was of little use, except in cases of relapse; and ipecacuanha was perfectly ineffectual.*

Medicated enemata, as a means of acting locally upon the intestines, are strongly advised by M. Trousseau and others. These may be composed of the acetate of lead, with or without laudanum, sulphate of zinc or copper, the ammonide of copper, &c.; but the one M. Trousseau prefers is the nitrate of silver, in the proportion of one or two grains to eight or ten ounces of water, once a day in mild cases, or twice a day when the attack is severe. It will be necessary first to clear out the bowels with a lavement of warm water, and then throw up the solution with the long tube and syringe. Dr. West has used gallic acid in an enema; and in protracted cases, when the tenesmus was very distressing, one of black wash containing laudanum, or one containing two grains of sulphate of zinc.

When the irritation is somewhat lessened we must proceed to evacuate the bowels, and I do not know a better means than castor oil diffused in mucilage, with a few drops of laudanum, as suggested by Dr. Stewart and Dr. West. Dr. West's formula for an infant a year old is as follows:—

R.—Ol. ricini, ʒj.
 Pulv. acaciæ, ʒj.
 Syr. simp. ʒj.
 Tinct. opii. gutt. iv.
 Aquæ flor. aurant. ʒvi.—M.
 A teaspoonful every four hours.

Or we may give a few grains of rhubarb and magnesia.

After the acute stage has somewhat passed, a succession of small blisters to the abdomen will be found of great service should the attack be prolonged; and we may also give some of the vegetable astringents

* Dublin Journal, May, 1840, p. 302, *et seq.*

recommended in diarrhœa, as being useful as tonics as well as in restraining the discharges.

"In an epidemic of dysentery that occurred among children in Washington county, New York, an infusion of white oak bark, blackberry root, and yarrow, in milk, with the addition of sugar, was found, according to Dr. Cogswell, to be productive of the best effects."* The following is the formula employed:—

R.—Cort. querci alb.
Rad. rub. villos. āā ʒss.
Fol. achill. milleflor. ʒij.
Coque in lactis, lbj.

A dessertspoonful to be given frequently.

In the epidemic of 1835, at Paris, the treatment consisted of local bloodletting, opiates by the mouth or rectum, and astringents. When these failed, or the disease became chronic, a large blister was applied to the abdomen.†

Dr. J. Cummings, of Mass. U. S., speaks highly of tannin, in dysentery. It may be given along with Dover's powder, or chalk powder, in doses of $\frac{1}{2}$ to $\frac{1}{2}$ grain three times a day.‡

The treatment of *chronic dysentery* is but a modification of what I have now laid down: counter-irritation, enemata of lead and opium, of nitrate of silver, &c.; calomel and ipecacuanha, with hyoscyamus or Dover's powder, warm baths, &c.

Williams and others speak very highly of the persesquintrate of iron, &c. Dr. Graves, in his excellent work, mentions that he has found the pernitrate of considerable use in chronic dysentery in adults;§ I have tried it with considerable success with children.

The child should be warmly clothed with flannel next the skin, and should have plenty of fresh, pure air. The diet at first must be bland and simple; mucilaginous fluids and milk and water may be given for drink, and for food, some farinaceous substances in very limited quantities.

After a while, indeed, the diet must be improved, as it will be essential to keep up the strength; and it may be necessary to give wine or brandy. Dr. West observes: "As to the time when stimulants are to be given, or the quantity in which they are to be employed, no definite rule can be laid down. Each case must be treated for itself; and to be treated successfully it must be watched most closely. The necessity for stimulants may arise suddenly, or the need of their administration may

* Condie, Diseases of Children, p. 244.

† Rilliet and Barthez, Mal. des Enfants, vol. i. p. 533.

‡ London Journal of Med., Nov. 1850, p. 1069.

§ Clinical Medicine, vol. ii. p. 226.

be but temporary ; while the infant's state in the morning, affords, in cases of severe diarrhœa, no sure criterion to judge what its state will be at night. In general it is not until the active symptoms have begun to decline that stimulants are needed, nor even then are they required in the larger number of instances." "About half a drachm of brandy given every two or three hours to a child of a year old, in a quantity of a few drops at a time, mixed with the cold milk and water, or the thin arrowroot with which it is fed, will often have the effect of arresting the sickness as well as of rallying the sunken energies of the system. No stimulant has appeared to answer the required ends better than brandy, and, when sufficiently diluted, children take it very readily. Sometimes, however, when it has been necessary to continue it for some time, it has seemed to occasion pain in the stomach, and even to nauseate the child, and in this case the compound tincture of bark, or the aromatic spirits of ammonia, or the two together, may be substituted for it ; and there is seldom much difficulty in administering them, if they be mixed with milk and sufficiently sweetened." Again, "the support of the child's strength is a matter of no less importance in chronic dysentery than the suppression of the diarrhœa. The great weakness of the patient, and the manifest distaste for nourishment of all kind, often render it necessary to continue the use of brandy for several days, or even for several weeks. For an infant not weaned, there can be no better food than that which is furnished by the breast of a healthy nurse. In the majority of cases, however, the child has been either in a great measure or altogether weaned before the affection came on, and consequently it is a less easy matter to supply it with suitable food. Farinaceous articles, such as arrowroot, sago, &c. are less easily assimilated in early life than in adult age ; and in cases of this kind they not unfrequently pass through the alimentary canal unchanged. Milk, too, does not always agree, and is sometimes ejected almost at once, unless it be given in a state of extreme dilution. Under these circumstances, we must not hesitate to give strong beef or veal tea in small quantities, but at short intervals, to the patient ; for though it be true that the bowels are often excited to increased action, in cases of chronic diarrhœa or dysentery, by animal breths, yet this is a smaller hazard than that of the child dying for want of sufficient nourishment."

CHAPTER XVIII.

HELMINTHIASIS. INTESTINAL WORMS.

THERE is scarcely an attack to which children are liable, nay, scarcely a symptom, which has not been attributed to worms, or in some way or other connected with them; and that not only by the people, but by medical authorities, with whom, indeed, popular prejudices generally originate. Even at the present time, any disease whose nature is not very clear, any symptoms of disorder of the digestive system, or of general nutrition, which is obscure, is solved by the magical abracadabra of "worms;" so that we are in some danger of being driven into the opposite extreme, and of supposing them not merely innoxious, but with Roederer and Wagler, and Dr. Butter, rather advantageous.

It may be as well, therefore, to commence this chapter by stating that while I neither deny the existence of worms, nor certain symptoms which are coincident with their presence, I very much doubt whether many such symptoms are caused by them. These symptoms may be a coincidence merely, or they may be the result of an irritation which gives rise to worms. Again, I do not believe in the existence of any symptoms pathognomonic of worms. Many such have been enumerated, but we may meet them all repeatedly without a trace of worms. I quite agree with Dr. West, that the only proof of worms being present, is seeing them. Having premised thus much, I shall first notice the varieties of worms which have been observed in the intestinal canal, referring my readers for more lengthened details to the elaborate researches of Bremser, Rudolphi, Bellingham, &c.

The *ascaris lumbricoides* occupies the small intestines principally, and is found sometimes in great numbers, occasionally, accumulated in the form of a ball. It is usually from three to twelve inches long, and from one to two or three lines in diameter. Its natural color is white, but it presents the color of the substances it swallows. It occasionally finds its way into the stomach, and may be discharged through the mouth or nostrils.

The *bothriocephalus latus*, *tenia lata*, or *broad tape-worm*, is thinner and wider than the common tape-worm, and very long, being often twenty feet long. Cases are on record of much greater length; it is said to have been sixty, seventy, or even a hundred feet. Its color is a dirty white, though it becomes gray when put in spirits. It has a large head, with two lateral grooves, which Rudolphi conceives to be organs for the absorption of nourishment. It is an inhabitant of

the small intestines, and is said to be very common in Poland, Russia, Switzerland, and some parts of France.

The *tenia solium*, or *common tape-worm*, is white and flat; its anterior extremity long and slender, with a narrow neck and a minute head, armed with four suckers, between which the mouth is situated, surrounded by a circle of five hooks. The posterior extremity is round, and the joints that separate from it are called *cucurbitani*. It is found in the small intestines, where it may attain a great length. There may be several together, and occasionally other worms are found along with it, according to Rosen. It is not common in very young children, although now and then it has been found in the intestines of the fœtus. Fortassin states that it occurs most frequently in persons engaged in preparing materials from fresh animal substances.

The *tricocephalus dispar*, or *long thread-worm*, is probably the most common, and is found in the upper portions of the large intestines. It is generally from an inch and a half to two inches in length; the anterior portion of its body is slender like a hair, and the rest much thicker. It is white, or colored by what it has swallowed. Its mouth is at the capillary extremity, which is always adherent to the intestine. The sexes are in different individuals. The number is almost always small; very often only a single one is found.

The *oxyuris vermicularis*, or *ascaris*, or *thread-worm*, is much smaller, being from one to four or five lines long, white, slender, and elastic, blunt at its anterior end, and with a rounded mouth. It is very common in the large intestines of children, and especially in the rectum. It is generally found in considerable numbers, imbedded in mucus, and often in rounded masses.

These are the chief intestinal worms: however, Dr. Dewees has named several others, as the *distoma hepaticum*, *fluks*, or *fasciola*, the *scarabæus*, or *beetle grub*, and the *æstrus*, or *bots*; and he alludes to worms or larvæ introduced by accident, and producing spasmodic colic, with griping, and occasionally vomiting, or dejection of blood.

Symptoms.—Let us now examine the symptoms which are said to precede, accompany, and follow the appearance of worms. Indications of gastro-intestinal disturbance generally precede the attack, such as disgust for food, loss of appetite, or voracious appetite, or perhaps each alternately; hiccough, dribbling, fetid breath, nausea, acrid eructations, sero-mucous vomitings, very acrid; borborygmi, umbilical colic, sometimes constipation; at others, glairy or mucous stools, meteorism, &c.

These symptoms continue, and to them are added pallor and puffiness of the face, softness of the flesh, emaciation and weakness, a slight tickling cough, headache, agitation, sleeplessness, dilatation of the pupils, itching of the nose, grinding of the teeth, creeping of the skin, and some degree of fever. The stomach and bowels are evidently disordered, the child complains of a good deal of pain, and of a troublesome itching about the anus. The urine may be turbid, yellowish, or

whitish, like milk and water. Finally, worms may be detected in the alvine discharges.

M. Legendre has published an analysis of the symptoms produced by tape-worm in 33 cases. Disorders of the cerebro-spinal system occurred in 20 cases, swooning in 7, disturbed vision in 6, buzzing in the ears in 3, and pricking or gnawing sensation at the epigastrium in 14 cases.* I may also refer my readers to the abstract of a paper by Prof. Wawzuch, which gives the result of very extensive experience,†

Dr. Horner first noticed an œdematous swelling of the upper lip and lower part of the nose, which he regarded as very characteristic; and Dr. Heberden thus sums up the symptoms from which worms may be suspected: "Headaches, torpor, vertigo, disturbed dreams, sleep broken off by fright and screaming, convulsions, feverishness, thirst, pallid hue, bad taste in the mouth, offensive breath, cough, difficult breathing, itching of the nostrils, pain in the stomach, nausea, squeamishness, voracity, tenesmus, itching of the anus towards night, and dejection of films and mucus."

Now, that we have evidence here of considerable disease of the mucous membrane, no one would question; but upon which symptom could we safely rest our diagnosis of the existence of worms, except their presence? Brera and others consider the face as characteristic; sometimes pale, sometimes flushed, and sometimes of a leaden color, with a dark circle under the eyes, which are dull and inexpressive, with tumefied nares and upper lip, itching of the nose, and epistaxis. According to M. Roman, the tongue has a pathognomonic character, consisting of small, prominent, isolated, rough, tubercular points, particularly at the edges. The breath is acid, or has a sickly odour, and the saliva is abundant.‡ M. Guersent mentions the glairy evacuations mixed with blood, and of a greenish-yellow color, with the abdomen sometimes tumefied, sometimes flat.§ Others lay great stress upon the umbilical colic, or upon a feeling of constriction in the pharynx. Others again, upon the acceleration and irregularity of the pulse, or upon the nervous symptoms. I do not mean to deny that such symptoms, and many others, may occur during an attack of worms; but I do say, that we meet them all when no worms are present, and that upon them, as evidence, we can place little reliance, and as proofs they are worth nothing. I perfectly agree with Rilliet and Barthez, who, after ample personal experience and extensive research, remark: "The examination of our own facts, compared with those published by authors, has led us to the conclusion that there is no other pathognomonic sign of

* London Jour. of Med., Nov. 1850, p. 1073.

† Ibid., p. 1074.

‡ Ann. de la Soc. Med. Prat. de Montpellier, vol. xxii. p. 110.

§ Dict. de Med., vol. ii. p. 243.

the presence of worms but their expulsion."* When any are expelled, it is presumable that there are more, although this is only probability, not proof.

Suppose we find the symptoms I have enumerated, or a sufficient number of them, including the decisive one of worms in the evacuations, are we quite sure that the symptoms are caused by the presence of worms? That similar symptoms may arise from gastro-intestinal irritation we know, and may not the worms, when present, be an accidental and harmless complication, or may they not even be an effect of the previous condition of the mucous membrane. It is a difficult question, and one upon which it would be presumptuous to speak positively, but I am very much inclined to think that ordinarily, worms give rise to very few symptoms at all, and that they may probably be the consequence of the preceding disorder of the intestinal canal.

It is right, however, that I should notice some other very important effects of worms, or what have been supposed to be such. MM. Mondiere† and Charcelay‡ have advocated the opinion that worms may perforate the intestine during life; and from having found them in the cavity of the peritoneum, Rilliet and Barthez seem to take the same view. It is opposed, however, by Rudolphi, Bremser, Scoutetten, Jules Cloquet, and Cruveilhier, who remarks "that the worms found in the cavity of the peritoneum, or in stercoral abscess, did not arrive there by perforating the intestine, but because it had been perforated previously."§ Worms have escaped from, or been discovered in abscesses of the abdominal parietes, and it has been supposed that the abscess was the result of the perforation and transit of the worms. M. Chailly gives an example of a case in a child of two years of age; and M. Mondiere, who has collected and analyzed the facts on record, concludes that the abscess may occur in any part of the abdomen, but is more common near the umbilicus, or the inguinal canal, and that the symptom which marks the passage of the worm is a painful sensation of puncture in one particular spot, followed by a colorless swelling, which gradually suppurates. M. Wedekind published an essay on the strangulated hernia occasioned by the accumulation of worms; and Rilliet and Barthez regard this supposition as "not irrational," although their researches have not furnished them with an incontestible instance.

Inflammation of the intestine is stated to have been the result of the accumulation of worms. Dr. Dewees mentions a case in which ninety-six worms, the shortest six inches, the longest ten, were discharged at once, forty-five of them in one mass. The child previously appeared "in great and constant agony." Again, intestinal worms have been

* *Mal. des Enfants*, vol. iii. p. 609.

† *L'Experience*, June 25, 1838.

‡ *Recueil de la Soc. Med. d'Indre et Loire*, 1839.

§ *Dict. de Med. et Clin. Prat.* vol. vii. p. 338.

discovered in other organs. MM. Guersent and Tonellé relate cases of their discovery in the liver; Haller, Arronsohn, Bland, and Tonnellé, of their presence in the air passages, the results of which were sometimes serious or even fatal. They have also been found in the nasal canal, the frontal sinus, and the ears. Lastly, a series of nervous attacks have been attributed to them; convulsions, chorea, pseudomeningitis, meningitis, &c.

As I have said, I cannot take upon myself to deny the explanation of these occurrences, but I am at liberty to confess that I am not satisfied to attribute these effects to worms; there is too much of the "*post hoc ergo propter hoc*."

Causes.—It would be a useless waste of time and space to enter fully upon the *questio vexata* of the origin of worms; I must refer such of my readers as are desirous of fully informing themselves upon the subject to the works I have already mentioned. It is sufficient for my purpose to say, that one party believe that they or their germs are derived from without, but that they undergo certain modifications within the intestinal canal; the other party, at once the most numerous and most distinguished, that they are entirely formed within the body, whether by hereditary derivation or spontaneous generation.

But what are the causes which favour their production? Bremser thinks that their formation depends upon there being more digested than absorbed matter in the intestines, and that from this animalized matter vermin have formed. Cruveilhier admits that a superabundance of nutrient materials may have something to do with their production.

It would appear that an hereditary predisposition to worms is transmissible. The age at which they are most frequent is from three to ten years, although we meet with them much younger. Between these two periods M. Guersent observed them in one-twentieth of the children. They are also said to be more frequent with girls than boys, and in children of a lymphatic temperament.

Worms are more prevalent in some countries and in some districts than in others; for example, in Savoy and Chambray, in France, through Holland and Switzerland, in certain parts of Germany and Russia. Mr. Marshall, Deputy Inspector of Hospitals, observes that Europeans and Africans are very much subject to worms in India. Mr. Annesley states that scarcely one in ten Hindoos is free from worms.

Moreover, the different species of worms prevail in different localities, according to Bremser, Rudolphi, and others; the bothriocephalus *latus* being more common in Switzerland, Poland, Russia, and some parts of France; and in Egypt, Holland, Germany, and the greater part of France, the *tænia solium*; the *oxyuris* and *lumbricoides* are more frequent in Great Britain, America, West Indies, and India.

According to Bremser, worms prevail more in cities than in the country, but Dr. Condie has not found this to be the case.

It would seem that cold, damp, low, unhealthy situations favor their production, and that they are more frequent during the spring and autumn than the other seasons. On this account we should expect that the children of the poor and wretched would be most afflicted by them, and this we find to be the case.

Do worms occur as an epidemic? It would appear so from the various accounts we have received.

Worm fever is described by various authors, but it may, I think be resolved into a gastro-enteric fever of the ordinary kind, complicated by a discharge of worms, whether essential or accidental, it would be hard to say. Roederer and Wagler found worms in the intestines of most of those who died of the epidemic mucous fever of Gottingen; and in a similar fever which prevailed at Naples in 1836, Thibault detected worms very frequently.

Treatment.—Recollecting what I have said of the little value to be placed upon symptoms as indicative of worms, the reader will see the importance of ascertaining, as far as possible, by the only sure means, whether there be worms, before adopting any specific line of treatment. It would be worse than foolish to administer the more powerful remedies against worms in a case in which we have no proof of their existence. But further, as we are not certain that the disorder which is undoubtedly present results from the presence of worms, I confess I much prefer trying to relieve the distress first, and then, if necessary, having recourse to means for destroying and expelling the worms. I am happy to have the support of Dr. Condie in this mode of practice. He states that “in any supposed verminous case, therefore, we would advise that all heating and irritating vermifuges be abstained from, and that our treatment be directed chiefly to restore the regular healthy action of the digestive organs, and the strength and vigor of the body generally. We have been in the habit of pursuing this plan for a number of years, and have seldom been disappointed in promptly and effectually curing our patients, and have had but little necessity for resorting to either of the articles which strictly appertain to the class of anthelmintics. With this view, the diet of the child should be carefully regulated; not only must it be limited to plain food, but even that must be given in smaller quantities than usual, and at regular times. In many cases we must be as rigorous in diet as was recommended in the chapter on diarrhœa. But if the irritation be not so great, in addition to bread and milk, rice, and arrowroot, we may allow a portion of animal food, chicken broth, beef-tea, chicken, or mutton chop. Vegetables, if used at all, must be so very moderately; fruit and confectionery should be interdicted.”

Air, exercise, and warm bathing, come next in importance to the regulation of the diet, and within reasonable limits should be carefully and fully employed. But little medicine may be required. A few grains of hyd. c. magnesiâ, if the bowels are confined; or hyd. c. cretâ,

if free, may be taken two or three times a-day. If there be diarrhoea, with much intestinal irritation, the remedies already recommended must be employed—counter-irritation, poultices, opiates, &c. If the bowels are steady, and the tongue pretty clean, I have seen good effects from the combination of a bitter tonic and an alkali; for example two grains of powdered columba root, with as much bicarbonate of soda, two or three times a-day, for a child two years old.

But supposing that there are no symptoms of gastro-enteric irritation or inflammation, or that these have been subdued, and we are required to attempt the removal of the worms, to what medicines should we have recourse?

Anthelmintics have been divided into those which succeeded by destroying the vitality of worms, and those which merely remove them. Dewees and others divide them into, 1, those which act medicinally upon worms; 2, those which act mechanically; 3, those which prevent the development of their ova or injure the young of the viviparous, or act beneficially upon the stomach and bowels.*

Among the former we may include *turpentine*, which may be given to very young infants, if mixed with mucilage, milk, almond milk, &c. and sweetened. From five to thirty drops may be given three times a day, according to the age of the child. It is by no means a pleasant medicine, nor will children continue to take it willingly for any time, although they may consent to do so for a few days. It may also be given in the form of enema, combined with gruel or barley-water, and with great benefit, in the case of ascarides in the rectum.

The *dolichos pruriens* or *cowhage* is highly recommended. It should be very carefully combined with honey or syrup, and a teaspoonful given for two or three mornings, before breakfast; the last dose being followed by a purgative. Its operation seems completely mechanical. the minute hairs wounding and irritating the worms; it is said to be chiefly useful against the ascarides and lumbrici.†

The *fucus helminthocorton* is a favorite remedy with French physicians, and their opinion is confirmed by Dr. James Johnson of London, who recommends a strong decoction to be given as an enema. Dr. Eberle advises that an ounce of the helminthocorton, with a drachm of valerian, should be boiled in a pint of water until reduced to a gill, and a teaspoonful given three times a-day. He considers it to be not merely an excellent vermifuge, but as very useful in that state of the alimentary canal which gives rise to worms, particularly when there is want of appetite and mucous diarrhoea.‡

“The *oleum chenopodii* is a remedy in considerable repute with

* Diseases of Children, p. 493.

† Neligan, Medicines and their Uses, p. 20.

‡ On Diseases of Children, p. 266.

American practitioners. We have employed it in some cases with considerable advantage, as follows :—

“ R.—Olei chenopodii, ʒj.

Sacch. alb. pur., gum acaciæ, āā ʒjss. M.

Dein adde aq. menth. sativ. ʒijss. M.

“ A teaspoonful every three hours for two days in succession, to be followed then by a dose of castor oil.”*

Dr. Dewees considers the *Spigelia Marilandica* (Carolina pink) as the most efficacious remedy against lumbrici. He gave the infusion with sugar and milk, and in large doses for three or four days—the last dose followed by a brisk cathartic.

Bremser and Eberle speak highly of the following formula :—

R.—Sem. santon., fol. tanacetii vulg., contus., āā ʒss.

Rad. Valer. pulv. ʒij.

Rad. jalep. pulv. ʒjss.

Sulph. potass. ʒij.

Oxymel scillæ, q. s. ut fiat electuarium

A teaspoonful to be taken two or three times a-day for six or seven days. It is more effectual, however, when so given as to produce consistent evacuations rather than watery stools.

The *empyreumatic oil* of Chabert is regarded by Bremser, Brera, and Rudolphi, as one of our best anthelmintics. From fifteen to twenty drops may be taken daily by children from two to seven years old.

Dr. Vauvert states that *flowers of sulphur* taken in the morning, before eating, is a most efficacious remedy.

The *stannum granulatum* is recommended by Alston, Patten, Brera, &c. Its *modus operandi* we cannot explain, but it occasions the worms to be evacuated. It may be given in doses of from half a drachm to two drachms twice a day, in treacle or syrup, with an occasional cathartic.†

“ Common salt,” Dr. Condie observes, “is, perhaps, one of the best anthelmintics we possess ; it has often succeeded in the destruction of worms when other remedies have failed. It was a favorite remedy with Dr. Rush ; and, whenever we have been able to induce children to take it in a sufficient dose, we have never been disappointed in its effects. An ordinary sized teaspoonful dissolved in a wineglassful of water, is the proper dose for a child of two or three years old.”

M. Peschier, of Geneva, has strongly recommended the tincture of the buds of the male fern (*polipodium filix mas*) ; and it is asserted by his brother that he cured 150 cases of lumbricoides, tricocephali,

* Condie, Diseases of Children, p. 256.

† Dunglison, Diseases of Stomach and Bowels in Children, p. 60.

and *tænia*, in nine months.* Dr. Fosbrooke obtained great success also with this remedy. The dose is from one to ten drops, in pills or on sugar. Drs. Gull and Willshire speak very highly of the oleo-resin of this plant.

Dr. West speaks favorably of the decoction of the bark of the pomegranate root, in cases of *tænia*, with an occasional purgative. Many other vermifuge remedies have been highly lauded, such as tannin, garlic, tin filings, *geoffroya inermis*, any of which may be tried if those I have enumerated should fail.

Each of these remedies, and many others, have been vaunted as of sovereign efficacy in worms; and yet each will fail, owing, probably, as Dewees shows, to the one kind of worm being affected by one anthelmintic, but not by others. Certainly, "that which shall detach and expel from the bowels *lumbrici* shall not stir the *tænia solium*." We must, therefore, endeavour to suit our medicine to the peculiar kind of worm.

The second class of anthelmintics includes all brisk cathartics—calomel, alone or in combination with jalap, scammony, or rhubarb; castor oil, gamboge, and aloes, in the case of *ascarides*. A full dose may be given, and repeated after a day or two, and we shall seldom fail to discover a quantity of these little animals in the evacuations.

In cases of *ascarides*, the greatest relief is often afforded by injections, so as to wash out the rectum completely—the decoction of the *fucus helminthocorton*, turpentine in gruel and water, black wash, solution of common salt, aloes, or sulphate of iron, lime-water and milk, *assafœtida* and milk, olive oil, sulphuret of potash, &c.

A bougie smeared with mercurial ointment, and passed into the rectum, is said to destroy these vermin very effectually.

After the worms, or a great portion of them, have been evacuated, the child will derive great benefit from the exhibition of some tonic. Marley recommends the infusion of *columba* or *gentian*, with infusion of rhubarb, and a little of the compound spirit of ammonia; Dr. Stokes the tincture of aloes, with the sesquichloride of iron; Dr. Rush, the carbonate of iron; Dr. Dewees, equal parts of the carbonate of iron and common salt; M. Cruveilhier, the "wine of quinine" to lymphatic children.

* Edinb. Monthly Journal, June 1852, p. 559.

CHAPTER XIX.

I. JAUNDICE. II. ENLARGEMENT OF THE LIVER, SPLEEN, ETC.

I HAVE included these subjects in one chapter, not because of any necessary or inseparable connection between them, but rather because it seemed useless to make several chapters about diseases concerning which we know so little.

I shall, therefore, first treat of *jaundice* in infants and children. I do not think it is by any means so rare as some authors have stated. If any one will take the trouble to watch an infant for a few days after birth, he will find the skin very red for a day or two, then it assumes a yellowish tinge, and finally becomes fair. The yellowish tinge varies in intensity up to a decided yellow, jaundice color. And in many cases I have seen infants continue suffering from this kind of jaundice for some days, and then, after suitable treatment, acquire their proper color. "In some instances, the skin of the infant will be marked by dull, yellow, irregular blotches (*maculae hepaticæ*), more or less extensive, and sometimes occupying the greater part of the surface. The color of these blotches varies in intensity; and in cases where there exists considerable derangement of the alimentary canal, they occasionally assume a very dark hue (*melasina*); in some instances they are accompanied with a prickly or tingling sensation. The disease appears to be most generally connected with derangement of the digestive organs; the color of the skin being dependent upon a morbid secretion from the cutaneous vessels; it has little or no affinity with jaundice."* In other cases, the infant is born jaundiced, the skin and conjunctivæ quite yellow: these are not very common instances. Or, after acquiring a proper color, the child is attacked by jaundice from some of the causes to be noticed presently.

Symptoms.—The symptoms are so characteristic that we cannot easily mistake the disease. The skin is yellow, or greenish-yellow; the conjunctivæ the same color; the urine and perspiration contain a large quantity of bile, and stain the napkins and shirt of the child yellow. The face looks thin, wrinkled, and old; the appetite is diminished; if very young, the infant sucks feebly, and does not seek after the breast. The discharges from the bowels may be dark-colored, if the meconium have not been entirely discharged; afterwards they

* Condie, Diseases of Children, p. 698.

are generally whitish or grayish: in some few cases their color is natural. At the commencement of the disease, the bowels are generally constipated; but I have seen an attack ushered in by diarrhœa, which ordinarily occurs after a few days.

The tongue has a yellowish-white fur, especially towards the base, and the palate occasionally exhibits whitish patches, which resemble the false membrane of muguet. Vomiting occurs sometimes, even after a moderate meal, but it is by no means an invariable accompaniment. There is frequently some griping, which the child shows by sudden cries and retraction of the limbs. The spirits are generally depressed, and the child may be more irritable than usual; but I have never seen delirium or convulsions result. Such are the ordinary symptoms of jaundice; in the greater number of cases there is neither swelling nor tenderness of the abdomen or region of the liver; but in some cases, M. Baumes mentions having found the hepatic region swollen and tense.*

When the disease assumes a chronic character, it is attended by progressive emaciation, tumefaction of the abdomen, sometimes with œdema of the lower extremities, or effusion into the peritoneum. The tongue becomes dry, and of a dark brown color; at an advanced stage there are occasionally spots of purpura, or bleeding from the mucous membranes. Induration of the cellular tissue also sometimes, but rarely, complicates this affection.

The disease may last from a few days to a fortnight, and then the skin acquires its proper color, the bowels become regular, and the appetite returns. But although, in general, it is a mild disorder, unattended by danger, we find that now and then it proves fatal.

Pathology.—It is not easy to explain the occurrence of jaundice in many cases. It may doubtless arise from some malformation or obstruction in the gall-duct, as first described, I believe, by Sir Henry Marsh in his excellent essay;† and I am inclined to think that this is the most common cause with young infants. This obstruction may be caused by inspissated matter in the duct, or by inflammation of the mucous membrane extending from the duodenum, as may be the case when jaundice supervenes upon diarrhœa.

Again, congestion and inflammation of the liver may give rise to jaundice, although hepatitis is not a frequent disease of childhood. The symptoms do not differ much from those already enumerated, except that in addition there is a degree of fulness and tenderness of the hepatic region. We must not forget how important a part the liver has played during foetal life, and its undue size at birth; this disproportionate activity previously, and the change to comparative

* *Traité de l'Icterus ou Jaunisse des Enfants de Naissance.*

† *Dublin Hospital Reports*, vol. iii. p. 292.

quiescence after birth, may have something to do with the liability to the complaint.

Lastly, jaundice may be caused by organic deterioration of the liver, though it is not always present, nor indeed are these diseases very frequent in childhood.

Causes.—Various exciting causes have been enumerated. M. Anthorn knew jaundice to occur after immersion in cold water. M. Levret conceives that the blood remaining in the umbilical vein, after it is tied, may become corrupted, and give rise to engorgement of the liver and jaundice. M. Andrieu attributes it to the pressure of the hands of the nurse upon the head of the infant; but these causes are not very probable, to say the least of them.

The irritation caused by the first attempts at digestion, improper food, excess of food, cold, damp, &c., may doubtless give rise to it. Constipation, by causing an accumulation of bile in the intestines, and its absorption, may favor its production according to M. Baumes.

Dr. West remarks, that the children in whom jaundice is most frequent and most intense, are the immature and the feeble; while in none is it so often met with, or in such an intense degree, as in infants affected with induration of the cellular tissue, in whom the yellow color is often so deep as to be manifest in the serum infiltrated into their cellular tissue, or poured out into the cavities of the chest and abdomen. "Interruption of the function of the skin and great impairment of that of the lungs are, as you know, the grand characteristics of that affection, while in many instances of it, the foetal passages are still pervious, and the blood circulates in part through the channels which ought to have been closed from the time of birth. These facts seem to substantiate the opinion entertained by many writers of high authority, that the jaundice of children is not due to any cause seated *primarily* in the liver, but rather to the defective respiration and the impaired performance of the function of the skin, of which the hepatic disorder and consequent jaundice are but the effects."*

I have known it to occur near the termination of gastric fever, and its nature was evident from the previous intestinal disturbance, the subsidence of the pulse, and heat of skin, although the icteric color of the skin and clay-colored stools persisted for weeks.

Prognosis.—In those cases which proceed from mechanical obstruction, from irritation extending from the duodenum, or from temporary congestion of the liver, the prognosis upon the whole would be favorable if we could distinguish them; after a little time, the disorder gradually subsides, and the infant is restored to health.

Other cases, however, are not so fortunate, and these I apprehend to be chiefly those in which the liver is organically affected. The child becomes emaciated and exhausted, the appetite is lost, the bowels are

* Diseases of Infancy and Childhood, p. 372.

permanently deranged, and the child is gradually worn out; it may be carried off finally by an attack of convulsions. Dr. A. B. Campbell has related three fatal cases. In one case the gall-duct was obstructed by inspissated bile, and the other two by congenital absence of the hepatic and cystic ducts.* The latter kind of cases are generally characterized by the occurrence of hemorrhage, generally from the umbilical cord, which can only be at most temporarily arrested.

Treatment.—For the cases which arise from retention of the meconium and accumulation of bile in the intestines, nature has provided a mode of cure in the purgative qualities of the early milk; the bowels being cleared, the cause is removed and the child will recover. Or if necessary, we may aid this by a dose of purgative medicine, rhubarb, castor oil, or what I have found even better, a single grain of calomel, repeated on the second day.

If we have reason to suppose that there is irritation or inflammation of the duodenum, we must first endeavour to relieve that by fomentations, poultices, counter-irritation, and internally by mucilaginous or chalk mixtures, with opium, the hyd. c. cretâ with Dover's powder, &c. When the diarrhœa or vomiting is relieved, then we may either continue the mercury with chalk, or have recourse to calomel, as the child may be able to bear it.

Should there be enlargement and tenderness in the region of the liver, indicative of irritation or inflammation, it may be necessary to have recourse to a leech or two, followed by poultices, and afterwards to blisters, accompanied by the internal administration of calomel or the hyd. c. cretâ, as the bowels may be able to bear it.

After the bowels have been regulated, M. Baumes recommends the black oxide of iron, the tartrate of iron and potass, or some vegetable tonic.

In the chronic form of the disease, Dr. Condie speaks favorably of turpentine, for the relief of the flatulent pains, in doses of from five to ten drops every three hours; at the same time he gives hyoscyamus, ipecacuanha, and carbonate of soda, and applies a camphorated mercurial plaster over the right hypochondrium. He has also found benefit occasionally from the alkalies in combination with a weak infusion of hops or taraxacum.

Considerable care should be taken of the diet, especially if there be much disturbance of the bowels. The nurse must be changed if there be any suspicion that her milk disagrees with the child; and at a more advanced age, nothing but bland, unirritating food should be allowed. Milk, arrowroot, panada, &c., will be found most suitable until the disease subsides, and then we may have recourse to a more invigorating diet.

* Northern Journal of Medicine, August, 1844.

II. ENLARGEMENT OF THE LIVER, &c.—Comparatively little notice has been taken of enlargements of the liver in children; they are not generally noticed in the systematic works, and I am chiefly indebted to a valuable monograph of Dr. Battersby's for the following details.*

Dr. Graves describes hypertrophy of the liver, as "that state in which there is an increase of size in the organ, with induration and imperfect secretion, but without any remarkable tenderness. This condition in children is accompanied with irritability of the digestive organs, fretfulness, emaciation, loss of sleep, and impaired nutrition. It is only a form of general cachexy, connected with the scrofulous diathesis, affecting secretion and nutrition in general, and the digestive and biliary systems in particular."† Dr. West has seen cases of what "he believes to be hypertrophy of the liver. For the most part they were associated with very obvious indications of a scrofulous habit, but on one occasion only was there any serious disturbance of the general health, the child, in that instance, suffering from very severe diarrhœa, which had succeeded to a state of somewhat obstinate constipation."‡

Rilliet and Barthez mention enlargement of the liver when speaking of hepatitis, which they consider very rare, having only seen six cases of it: "It commences by a slight febrile movement, accompanied by increased thirst and loss of appetite. At the same time, or shortly afterwards, an icteric tint is perceived, limited at first to the conjunctivæ, and slight, but soon becoming very marked. The liver then augments in volume, passes the ribs, extends to the epigastrium, and ascending in the hypocondrium, increases the dulness of that region. The tumor is ordinarily indolent, easily circumscribed when the abdomen is soft and flexible, but is defined with difficulty when it is distended. At the same time that the jaundice and tumefaction of the liver are manifest, the urine becomes changed and of the color of beer. The stools were few, liquid, and discolored. At the end of a variable time, the febrile movement diminishes and disappears; thirst is no longer felt; the appetite is recovered. The tumor of the liver, which has progressively diminished, still continues; it, however, soon disappears. The icteric coloration is in part effaced; the urine recovers its normal color, and at the end of twenty or thirty days all the morbid symptoms have disappeared."§ Of Rilliet and Barthez's six cases, five recovered.

Dr. Battersby's cases, in some respects, resemble the foregoing description, although the history and results differ considerably. He met with sixteen cases, and out of eleven, six died, two of them of scarlatina; four recovered, and one remained under treatment. As to

* Dublin Journal, May, 1849, p. 308.

† Clinical Medicine, p. 566.

‡ Diseases of Infancy and Childhood, p. 432.

§ Mal. des Enfants, vol. i. p. 578.

the ages, one was under one year; four from one to two years; six from two to three years; one from three to four years; one from four to five years; and three from six to seven years.

As to the symptoms, Dr. Battersby observes: "In thirteen there was, in general, a slight febrile action, with tenderness on pressure over the liver; in some the stools were uncolored, and the urine was deeply tinged. In ten, jaundice existed for some time; in five, ascites or anasarca; in one, phthisis; in one, pompholix; and one was affected with laryngismus stridulus. The children were generally languid, wasted, and had a dirty, jaundiced hue of countenance. The abdomen was much enlarged, its veins were distended, and the liver could be most distinctly felt extending, at various degrees of distance, from the ribs to the pelvis. In one case only I received intelligence of pain being felt in the right shoulder. Instead of the enlargement of the liver disappearing in twenty or thirty days, I have seen it after the continuance of a year, one year and six months, two years, and even three years and a half." In one case clots of black blood were passed by stool and vomiting, a week before death. But the most remarkable symptom, and one which, so far as I know, has not been noticed in children as a concomitant of disease of the liver, was a depraved appetite, or *pica*, as it is called. It was observed in seven of these cases of enlargement of the liver; but whether the direct result of the disease, or the consequence of some condition of the stomach induced by the disease, it is not easy to say. "As a general rule," Dr. Battersby remarks: "this is one evidence of undue lactation, for of fourteen cases in which I noted it, the average duration of suckling was twenty months; six of these cases were suckled two years and upwards; and one of them weaned at one year, was continued at the breast for seven months during utero-gestation of a succeeding child. I have remarked that these little children eat greedily of coals, cinders, ashes, lime off the walls, dirt, shoes, paper, and even their own ordure. Children affected with *pica* are very delicate and wasted, their complexion is sallow, anæmic, and waxy, the abdomen enlarged. The bowels are generally too free; the stools are of all colors, green, yellow, black, or white." I have seen a case, however, in which this depraved appetite was apparently hereditary, and unconnected either with nursing or disorder of the stomach or liver. In two cases the hypertrophy of the liver originated in disease of the heart, and in another it was complicated with pleuritis and pericarditis.

In the only *post-mortem* examination given by Dr. Battersby, the liver was greatly enlarged, red, and filled with blood, but unaltered in structure.

Treatment.—If we see the case early, and have reason to suppose the existence of active inflammation, or if, at a later period, there be much tenderness, the child will derive relief from the application of leeches in numbers proportioned to its strength.

If it be too weak for leeches, or if the symptoms do not demand

them, counter-irritation by blisters or liniments may be tried. A very good plan is to paint the abdomen with tincture of iodine over the region of the liver every morning.

Internally, mercury is the best remedy. It must be given in such a form and dose as shall be tolerable to the bowels, and it will scarcely be advisable to push its use too far.

The ioduret of iron acts very beneficially at a more advanced stage of the disease. It may be given in syrup, in doses of one-eighth of a grain, three times a day, to a child of two years old.

If the child be a year old it must be weaned immediately, and a good nourishing diet allowed; if under a year, it will probably be advisable to change the nurse.

III. ENLARGEMENT OF THE SPLEEN.—This disease has hitherto been supposed to be peculiar to adults, but Dr. Battersby has observed seven cases of it, apparently the consequence of undue lactation. Of six of these cases, three died; it is, therefore, a serious disease. Their appearance agrees with the description given by Piorry: "When the spleen has been long affected the skin gets a dull aspect; a grayish coloration presenting sufficiently well a light-colored creole shade, but with color less warm and more ashy. It is the integuments of the face, especially, where this coloration is most remarkable. It is not the yellow-ochrey color of icterus, nor yet the discoloration of chlorosis; it is a shade quite special, which has been very ridiculously called *bluish icterus*."*

"The conjunctiva is bloodless, and the patients manifest a perfect indifference to everything around them. They have a sickly, pallid look, and the wasting of the body is not in proportion to the paleness. They are truly chlorotic; they have invariably pica; the bowels are generally irregular; the abdomen is full. The patient's bulk will remain pretty good for a long time, although he will become blanched in a state of anæmia. The blood is not proper in quality; it is deficient in fibrine, and likewise in red particles. The peritoneum sometimes becomes affected, and produces ascites, which renders the detection of the spleen difficult. The diagnosis is generally very easy, long before the spleen has attained a large size. The heart is unaffected in these cases. It has been said that the spleen is often hypertrophied in scrofula and rickets; this, however, is by no means an established fact; and when there is tumefaction of this organ there is no peculiarity about it, and the other viscera, especially the liver, are simultaneously engaged."†

Dr. West connects enlargement of the spleen with intermittent fever and malaria. "The only instance of it," he says, "which I have had

* *Traité de Diagnostique et de Semeiologie*, p. 287.

† Dr. Battersby, *Dublin Journal*, May, 1844, p. 318.

an opportunity of observing was presented by a little girl six and a half years old, who had lived at Fernando Po from the age of two and a half years, having had dysentery at three years, and frequent attacks of fever subsequently. The enlargement of her spleen had first become apparent at five years of age; and when I first saw her, a few weeks after her return from Africa, it had attained so considerable a size that her abdomen measured twenty one and a half inches in circumference. The spleen in this case reached from under the ribs quite down into the pelvis, and forward as far as the mesial line of the abdomen. Independently of the patient's history, which, in a case of this kind, would be of itself sufficient to prevent an erroneous diagnosis, the relations of the swelling were characteristic; for, although situated at the side of the abdomen, it did not extend backwards into the lumbar region, so as to fill it up completely, as an enlarged kidney would do, but a considerable interval existed between the posterior margin of the tumor and the vertebral column."*

The *diagnosis* of the enlargement of the liver and spleen is almost always easy by an abdominal manipulation, the tumefaction on the right or left side being very characteristic, and the dull sound on percussion marking as clearly the limits of the tumour.

I have seen such cases occasionally myself among the ill-fed, ill-clothed, and neglected children of the poor. In the better ranks I do not think either disease frequent; nor can I agree with Dr. West, that the enlargement of the spleen is necessarily connected with intermittent fever, which is rare in Dublin.

Treatment.—The only treatment which Dr. Battersby has found of any use is weaning the child when oversuckled, and giving nourishing food; sending it out freely in the open fresh air, and administering internally the ioduret of iron, and externally painting the abdomen with the tincture of iodine, or friction with the ointment of hydriodate of potass.

* Diseases of Infancy and Childhood, p. 436.

CHAPTER XX.

TABES MESENTERICA.

IF the reader will take the trouble of referring to the chapter on pulmonary phthisis, he will find that the mesenteric glands were more frequently the seat of tubercular deposit than any other organ of the body, except the lungs and bronchial glands; that in one hundred cases, MM. Rilliet and Barthez found the mesenteric glands affected in forty-six. This tubercular deposition into the mesenteric glands is the disease which has been termed *tabes mesenterica*, although, as it is generally a complicated affection, the description is generally more or less uncertain, inasmuch as the symptoms essential to the tubercle have not always been distinguished from those which result from the intestinal or peritoneal irritation or inflammation.

Among the children of the poor, it is by no means uncommon in these countries, though among the richer classes it is comparatively rare. Rilliet and Barthez found it in one-sixteenth of the children. Out of 144 cases, twenty-seven were between the ages of one and two and a-half, forty-one from three to five and a-half, fifty-seven from six to ten and a-half, and twenty-one from eleven to fifteen years of age. Of this number, ninety-three were boys and fifty-one girls. They further state that the younger the child is, the slighter is the attack. Dr. Merriman speaks of it as occurring in infants at the breast as well as in older children; but this I must believe to be rarely the case. From my own experience, I should say that it is most frequent from three to four to eight or ten years of age. M. Barrier remarks that it is very common in phthisical children.

Symptoms.—Let me again observe that the symptoms which accompany this disease, are not referable simply to the condition of the glands, but arise from the intestinal disorder which so generally precedes and accompanies the affection, and from certain other more rare complications of the peritoneum, &c. In some cases, however, there is a singular absence of all indications of disease, the first discovery being made on examination after death, as, for example, in the case related by M. Bayle, of a little girl who died from a burn, in apparently good health, but in whose mesentery was found a dozen tubercles of considerable size in a state of partial suppuration. Similar cases are mentioned by MM. Morgagni and Guersent, and probably most of us have found more or less deposition in these glands which had yet attracted no attention during life.

In other cases, however, the symptoms not only excite suspicion, but are at length sufficiently well marked to enable us to determine the nature of the essential disease. Probably the earliest symptom which excites attention, is a failure in the health and healthy looks of the child: it is uneasy, pale, fretful, the appetite diminishes, the bowels are disturbed, and it loses flesh. For a time this may be all, and it is evident that the cause is disorder of the digestive system, and not necessarily tabes mesenterica. However, sooner or later other symptoms are superadded, and the most significant is a dull, deep-seated pain about the centre of the abdomen, increased by firm pressure, but which is not necessarily accompanied by tension or vomiting, nor does it resemble the tenderness of peritonitis. It may persist a long time without much change, and with no more peculiar characteristic; but, according to M. Guersent, it is most remarkable during spring and autumn, often disappearing during the heats of summer.* If the bowels be much disturbed, we may have some tympanitic enlargement of the abdomen; at the same time in estimating this, all through the disease, we must not forget that a child's abdomen is naturally somewhat prominent and disproportionate. At this period we shall rarely find any fluid or solid enlargement.

As the disease advances, the symptoms all become aggravated, and the constitution deeply suffers. The appetite is variable, sometimes slight, in other cases almost voracious, with a desire for depraved food, as chalk, earth, &c. in some cases, but this I do not think so common as in disease of the pancreas. The bowels are very irregular, sometimes constipated, at other times too frequently moved; the discharges being frequently slate, or clay-colored, or brown, and highly offensive. The pain in the abdomen continues, or even increases; sometimes there is a tympanitic enlargement, in other cases, but more rarely, fluid may be detected. If the abdomen be tense, of course the tumefied mesenteric glands cannot be felt; but if not, we may frequently ascertain their presence, especially if much deposition have taken place. MM. Rilliet and Barthez remark upon this subject: "Although the tuberculous masses which occupied the glands were often very voluminous, we were far from being able always to appreciate them by the touch. Thus it was impossible to recognise these tumors when the tension of the abdomen was very considerable; and in other cases in which it was less, a repeated and minute examination failed. There are, however, cases in which we could ascertain the presence of abdominal tumours even though small, but then the abdomen was very flaccid and extremely soft, allowing itself to be depressed even to the vertebral column. In other cases, modifications arising from meningitis, facilitated the palpitation of the abdomen, and permitted us to

* Dict. de Méd. in 30 vols., vol. vi. p. 444.

recognize the tumor in its cavity. In the case of a boy of five years, the abdomen was very unequal, knobby, projecting at the hypogastrium, depressed at the epigastrium, flaccid and soft. Immediately beneath the umbilicus, we perceived a tumor which passed the median line on either side a finger's breadth and a-half. This tumor was very hard, slightly moveable, and its tense edge rather sharp. The next day it appeared more superficial because of the sinking and softness of the abdominal parietes. The superior portion was very moveable, but the deeper portion was less so. It appeared larger than on the preceding evening, probably because we could circumscribe it more completely. On making the autopsy, the mesenteric glands formed a mass as large as the fist, composed of a number of tuberculous glands the size of a small egg. Some were entirely tuberculous, in others, tubercular matter occupied the centre, and the surrounding glandular tissue was enormously developed." These distinguished observers further add, that the abdominal tumors, resulting from tubercularization of the mesenteric glands, are always situated near the umbilicus; they are more or less voluminous, but generally unequal on their surface; we can perceive that they are formed by the agglomeration of a number of tubercular masses. One might believe, *à priori*, that the fixity of the tumor was a constant characteristic, but it is not always so; sometimes, because the glands are not sufficiently enlarged to maintain the mesentery immoveable against the vertebral column; in other cases because the glands themselves do not change their place. But this apparent mobility, according as the abdominal parietes vary in tension according as the intestines are full or empty, affords us varying results, from an examination of the abdomen after a few days' interval.*

Let me repeat the caution, that the disproportionate size of the abdomen which is remarkable in rickety and scrofulous children, should not be mistaken for the enlargement of the mesenteric disease. With this enlargement of the abdomen, there is a corresponding emaciation of every other part of the body; the skin becomes loose and flaccid, its color changed to a dirty, sallow hue; the face is wrinkled and the features become sharper, so as to produce a very distressing expression of suffering. The pulse is permanently quick, but more rapid towards evening, when a kind of hectic fever sets in, lasting till near morning, and terminating in profuse sweat. The urine is scanty, and contains an excess of phosphates.

Thus we have disorder of the stomach and bowels, increasing in amount and varying in character, deep seated pain in the centre of the abdomen, tumefaction of the abdomen by air or fluid, sometimes enlargement of the mesenteric glands, and hectic fever.

* Mal. des Enfants, vol. iii. p. 443.

But we may naturally inquire what are the mechanical or other effects of this enlargement and degeneration of the glands? How far it offers an impediment to the circulation through the lymphatics and blood-vessels? Sömmering, and other authors, do not believe that the lymphatic circulation is injured at all, but that when the glands are entirely obstructed, it is completed by the anastomosing branches and the chyle thus conducted to the thoracic duct. Barrier, however, suggests, and I think reasonably, that the defective nutrition in tabes mesenterica may be owing partly to this state of the glands. I may add, that it may also be owing to the impediment in this situation that we sometimes find fluid effused into the peritoneal cavity without evidence of inflammation. It does not appear that the mere pressure of the tumors ever produces stoppage of the intestines, although M. Guersent mentions that he has known adhesions between the mesentery and the peritoneum produce strangulation, or even complete occlusion of the intestines.

It sometimes happens that an adhesion is formed between the tubercular mass and the intestines, when the former suppurates, and Rilliet and Barthéz mention that they have seen the commencement of perforation of the intestine at this part. Others mention that through such a perforation the softened tubercle is discharged. We are told on the authority of Sir A. Cooper, of this tubercular matter making its escape by an abscess which burst at the umbilicus, and was afterwards cured by adhesive plaster.* When the diseased mass is very large, it is said to give rise not merely to ascites, but to anasarca of the lower extremities, from its pressure on the veins, especially at an advanced stage of the disease. Lastly, the patient is obnoxious to inflammation of the intestines, but more especially to chronic peritonitis, partial or general, with its train of symptoms to be noticed presently. I must not omit to mention also that as tubercles are seldom deposited in the mesentery alone, we may have a complication of diseases, such as tubercular meningitis, bronchial and pulmonary phthisis, &c. &c.†

The duration of the disease will depend very much upon the presence or absence of these complications. In many cases the disease may go on for months before we are quite certain of it, and the child may linger until fairly worn out by hectic fever and want of nutrition; in other cases the occurrence of enteritis or peritonitis, acute or chronic, will hasten the fatal termination.

Morbid Anatomy.—The appearances found on dissection vary a good deal, according to the period of the disease, and even at the same period. At an early stage we may find the glands but little, if at all enlarged,

* Coley, Diseases of Children, p. 223.

† Rilliet and Barthéz.

of oblong shape, pale, of a natural color, and with no appearance of inflammation. On cutting them open, we discover tubercular matter, either in the form of small grains or in larger irregular masses, not mixed with nor adhering intimately to the proper tissue of the glands, but rather compressing it, and lying between it and the peritoneum.

Again, the glands may be inflamed, and then they will present a different appearance, the proper tissue will be found red, enlarged, and engorged with blood, more resisting to the scalpel than is natural, and increased in volume. The tubercular matter may assume the form of rounded or irregular grains, or we may find it, but more rarely, as patches, or irregular laminæ which insensibly merge into the proper glandular structure. Whether the glands be inflamed or not, and whether the tubercular matter be deposited in the substance or only on the surface, it is sometimes surrounded by a cyst, more or less distinct; in other cases the cellular tissue which surrounds it is gradually confounded with the glandular substance, and is partly in contact with the peritoneum, which serves to complete a kind of cyst.

When this mesenteric disease is extreme and of long standing, M. Guersent observes that the glands are often completely destroyed, or transformed into isolated or agglomerated masses of tubercle, of different sizes, from that of a pea to that of an egg, in which no trace of glandular structure can be detected. The tubercular matter is occasionally deposited between the laminæ of the mesentery, and then forms patches of greater or less extent, which have sometimes been mistaken for a kind of abscess when the tubercular matter was softened. True abscesses in this situation are very rare. Mesenteric tubercles undergo all the stages of degeneration to which this morbid product is exposed. At first crude, they are of a dull white color, or opaline or yellowish. When the tubercular matter is scanty, and as it were infiltrated in the tissue of the gland, it is sometimes traversed by small, delicate capillary vessels, which subsequently disappear. In the latter stages we find every degree of softening, from a curdy pulp to fluid pus. It is rare, however, to have very fluid pus in mesenteric tubercles, either because it is partly absorbed or because the patients die before the last change has taken place. We find occasionally a dry and pasty matter, analogous to what we see in tuberculous bronchial glands. At whatever stage the tubercles may have occurred, the peritoneum is almost always healthy, transparent, or slightly tinted with a pink color. In some few cases it is red, inflamed and adherent to the intestines. M. Papavoine mentions a case in which the mesenteric glands were converted into greenish-yellow tubercles containing a limpid fluid of the same color in the centre. The same author saw in a scrofulous boy, the mesenteric glands enormously enlarged, with a central cavity, with unequal patietes containing a deep red opaque fluid, analogous to bile. M. Barrier mentions that the changes connected with the peritoneum are generally either tubercles, adhesions, or serous or sero purulent effusion.

The mucous membrane of the intestine is not uncommonly red and inflamed, especially towards the end of the small intestine, where the mucous glands are most largely developed. In some cases we find small, round, superficial ulcerations and traces of former ulcers. But besides these small ulcerations, there are occasionally deeper ones involving all the coats of the intestine and piercing sometimes through the peritoneum. These larger ulcers are generally placed circularly and parallel to the transverse valves of the intestine. In appearance, they resemble very much the ulcers we find in the intestines of phthisical patients. They occur, according to M. Guersent, in more than half of the cases of tabes mesenterica. On the other hand, the mucous membrane is often perfectly healthy, even in cases where the glands are the seat of considerable tubercular deposition.

If the child have suffered from chronic peritonitis, we shall of course find the usual morbid changes, and the same may be said of the other complications, but upon these I need not dwell as I have noticed them in detail elsewhere.

Diagnosis.—After a careful analysis of the symptoms of this disease, M. Guersent remarks, “it results from this discussion upon the physiological characteristics of tabes, that almost all the symptoms which have been hitherto assigned to this disease, do not really belong to it, but depend upon other affections of the intestinal canal with which it is often confounded, because they ordinarily accompany it. The only pathognomonic symptom, the only positive character by which tabes mesenterica can be recognised in its last stage, is feeling the tubercles by the touch: all others are more or less doubtful, and mark the disorders with which is it complicated.”* Although it is true, to a certain extent, that many symptoms have been too lightly attributed to this disease which are not essentially connected with it, and also that but little stress can be laid upon any single symptom (except the one) taken alone; yet I can hardly doubt that we may assume the presence of the disease with strong probability from the constitution of the patient, the history, the sequence, and combination of certain symptoms.

1. In the earlier stages, it may be quite impossible to decide whether the intestinal irritation is connected with tabes or depends upon *chronic enteritis* only, because the two diseases constantly coexist. M. Guersent mentions that in the former the diarrhoea and pain are increased by the slightest errors of diet, but not by movement, whereas in the mesenteric disease, the pain is augmented by pressure but not by flatulent distension or diarrhoea. Add to this a scrofulous constitution, perhaps the presence of tubercles in some other part, the persistence of the symptoms notwithstanding appropriate treatment, and

* Dict. de Méd., in 30 vols., vol. vi. p. 447.

unusual dulness on percussion around the umbilicus, and we have ground, I think, for suspecting very strongly the presence of this disorder.

2. The history of the disease will aid us in distinguishing it from *chronic peritonitis* in some cases, but no doubt a degree of obscurity will often remain, inasmuch as the two diseases may coexist.

3. At a more advanced stage, when the tumors are perceptible, the diagnosis will of course be much more easy and certain, and yet some confusion may arise between them and *tubercles of the liver and kidney*. The principal points of difference laid down by MM. Rilliet and Barthez are 1, the seat of the latter tumors in one or other hypochondrium; 2, by the form of the tumor which terminates in a sharp edge; 3, by the possibility of pushing back these tumors under the ribs; 4, by the increase of dulness in one or other hypochondrium; and 5, by the absence of tension and distension of the abdomen. Still, there are some cases in which the diagnosis is and will remain very obscure; and I may say the same of the distinction between pancreatic tumors and mesenteric disease.

Causes.—Whatever causes favor the development of scrofula, or tubercle generally, will, no doubt, aid powerfully in the production of mesenteric disease. When the general and local tendency to tuberculosis exists, we can easily understand its being stimulated into activity by improper and insufficient food, dirty and badly ventilated dwellings, exposure to cold, insufficient clothing, &c.; but we cannot tell why in one person the lungs are affected and in another the abdominal organs or the mesenteric glands.

Prognosis.—Nothing can be more serious than the prognosis in mesenteric disease, at an advanced stage, when the tumors can be felt. Almost all the cases prove fatal, either by gradual exhaustion or by the occurrence of some complication. At an early stage, patients recover from the intestinal disturbance, &c.; but then the question arises whether the disease were really tabes, and the answer in many cases is very doubtful. M. Barrier thus states his experience: "The prognosis of tubercular affection of the abdomen is at least as grave as that of tubercles of the thorax. In fact, the first rarely exist without the second, although the latter may occur without the former." "In some cases, abdominal phthisis runs its course with great rapidity, especially when the mesentery, the peritoneum, and the intestines are all affected; but when these are singly affected, their course is slower." "That which proves fatal in many cases before the tubercles of the abdomen have completed their stages is the coincidence of tubercular affection of the thorax, head, &c., or certain local or general complications, as perforation of the intestine followed by acute peritonitis, meningitis, eruptive fevers, &c. There is no reason, however, to disbelieve in the possibility of a cure, or at least of rendering the malady stationary. The cure may take place, 1, by the softening and elimination of the

tubercular matter; 2, by its transformation into cretaceous matter; 3, by its absorption."* Rilliet and Barthez mention a case in which a portion of the tumor had been absorbed and the remainder had undergone the cretaceous transformation. A similar case has been recorded by Dr. Carswell, who states that the patient, who, when a child, had been affected with tabes mesenterica, and also with swelling of the cervical glands, some of which ulcerated, died at the age of twenty-one, of inflammation of the uterus, seven days after delivery. Several of the mesenteric glands contained a dry cheesy matter, mixed with a chalky looking substance; others were composed of a cretaceous substance; and a tumor as large as a hen's egg, included within the folds of the peritoneum, and which appeared to be the remains of a large agglomerated mass of glands, was filled with a substance resembling a mixture of putty and dried mortar, moistened with a small quantity of serosity. Unfortunately, all these modes of cure are rare, and I fear that the true explanation of the many cases of cure which have been recorded is to be found in the fact that the disease was really only chronic enteritis or gastro-intestinal irritation.

Treatment.—Very much will depend upon the state of the child and upon the stage of the disease.

During the early stage, or when the intestinal irritation is the most prominent symptom, our efforts must be directed to quiet that, and to regulate the secretions and actions of the bowels. Some of the anodyne astringents I have mentioned, when speaking of diarrhœa, if the bowels are too free, with, perhaps, some counter-irritation to the surface, will often succeed. When the bowels are quiet, the secretions may be corrected by hyd. c. cretâ, combined either with rhubarb or columba; and, as a change, I have seen much benefit from some bitter tonic, as columba powder and an alkali. When the bowels are confined, mercurial purgatives are of great use; and many authors lay great stress upon purgatives and emetics as a means of removing the disease. This may be the case in the earlier stages, but it may well be questioned whether they have this effect, if deposition have taken place. In some cases, when the abdomen was beginning to enlarge, after I had regulated the bowels, I found the iodide of iron of great use, in the proportion of one grain of the salt to an ounce of syrup; a teaspoonful to be given three times a day, to a child three or four years old. It is doubtful in such cases whether the benefit does not altogether depend upon the action of the medicine upon the mucous membrane of the intestinal canal rather than upon the mesenteric glands.

All British authorities are agreed, I think, upon the value of mercury at some period of the disease, although they differ as to the stage, in which it is most serviceable. French writers, however, seem very

* Mal. de l'Enfance, vol. ii. p. 351.

doubtful. I have not myself had recourse to much mercury in the earlier stage of the disease; but Dr. Coley speaks well of its effects. He recommends a scruple of the ung. hyd. first to be rubbed over the abdomen every night for half an hour, and that the patient should take every night from two to four grains of Dover's powder, and three or four grains of hyd. c. cretâ. Every second or third morning, a dose of castor oil is to be given, or a grain of calomel and three or four of rhubarb, and this treatment must be continued for some time, unless the gums be touched.* Dr. Merriman advises calomel in large doses at first, and then smaller ones for a considerable time when the belly is enlarged, until some favorable change takes place in this particular. M. Wendt advises a combination of sulphur with calomel in the proportion of one part to twenty. A light bitter tonic has also been found very useful, either alone or in combination with an alkali.

After the deposit of tubercular matter has fairly taken place, or after we believe it has done so, the principal remedies are said to be mercury, iron, iodine, acetate of potash, &c., sulphur, iodine, or sea baths. The mercury may be given in form of calomel, blue pill, or hyd. c. cretâ, or we may have recourse to inunction, and the extent to which it should be carried will depend upon the condition of the child and the state of the bowels. Various preparations of iron have been recommended by different writers. The tincture or salt of steel or chalybeate waters are preferred by some; others prefer the carbonate or the tincture of the muriate, &c. The same may be said of odine, some advise one form, some another; the great point appears to be to guard against any injurious action upon the gastro-intestinal tube. I have found the iodide of iron in syrup apparently better than either element separately. Some prefer Lugol's solution in doses of three to six drops three times a day, or the hydriodate of potash in decoction of sarsaparilla, adding a minute dose of opium if the bowels be irritable, or suspending the medicine altogether.

As an external application, Dr. Condie advises the iodide of lead (ʒss to ʒj of lard), or the ung. hydriod. potassæ. Or the abdomen may be rubbed or painted with the tincture. Ioduretted baths have been highly recommended; they are formed by dissolving one grain of iodine and two of hydriodate of potash in a gallon of water.

From the benefit derived from cod-liver oil in phthisis, we may naturally expect similar effects from it in mesenteric disease; but although I have found it useful in some suspected cases, yet they have been too undecided and too few to enable me to speak positively, and I have not as yet seen any record of an adequate trial of the remedy by any one else. But as a general rule the success seems very limited; in many cases anything like active treatment is injurious, and

* Diseases of Children, p. 226.

the utmost we can effect is the palliation of the more distressing symptoms.

Inasmuch as bad air, inferior or innutritious diet, and exposure have much to do with predisposing to or producing the disease, our attention must be carefully directed to these points. Fresh, pure air, well ventilated, comfortable apartments, and warm clothing, are all absolutely necessary.

Bland, mild food must be selected until the fever and intestinal irritation subside. A milk diet is generally the best, or arrowroot with water or milk. Broths must be given with great caution, and generally speaking animal food is objectionable.

Frequent washing portions of the body, warm or cold baths, will also be found very useful, both as prophylactic measures, and also as remedies if the disease be not too far advanced.

The indications of treatment for the different complications will be found in the respective chapters.

CHAPTER XXI.

PERITONITIS.

INFLAMMATION of the peritoneum is a rare, and, when acute, a very fatal disease among children, much less frequent than either pleurisy or pericarditis, and, if I might judge by my own experience, I should add than arachnitis; but Rilliet and Barthez found it more so than the latter. In examining the bodies of children who have died from other diseases, it is by no means uncommon to find evidences of pleuritis or pericarditis which have been cured, but we scarcely ever find such traces in the peritoneum, from which I infer either that the disease is very rare, or that it carries off its victim. Rilliet and Barthez met with a dozen cases of acute peritonitis. M. Thore found that acute peritonitis existed in about six per cent. of all the infants who died at the Hospice des Enfants trouvés.

In certain seasons it seems more common than in others. I met with three cases in one winter within a short time of each other, and

judging from them, I suspect that cases that are put down as enteritis are as frequently peritonitis.

This affection has been but little noticed by writers upon diseases of children. Dr. Romberg, of Berlin, in 1833, published a valuable paper upon the subject.* Meissner† has entered pretty fully into the subject. Heyfelder,‡ and Malespini,§ and Thore,|| have published some interesting papers. It is noticed by Drs. Stewart and Condie.

Peritonitis may be either *acute* or *chronic*, the latter occasionally being of a scrofulous character, and accompanied with the deposition of tubercular matter on the serous membrane. The disease may be either *primary* or *secondary*, but much more frequently the latter. It may occur before birth, as the researches of Dugès, Billard, Simpson, &c., have proved, and at any age subsequently. Of M. Thore's cases, thirty-five out of fifty-nine were less than a fortnight old, and none above ten weeks.

1. *Acute Peritonitis*.—The attack is generally somewhat sudden, coming on either in the midst of health, or in the course of some other disease, and marked by severe abdominal pain, commencing, perhaps, at some one part, but quickly spreading over the entire abdomen, and *greatly increased by any movement*. In very young infants it is sometimes not very well marked at first, but, with very few exceptions, it is always present. The pain rapidly becomes very acute, greatly increased upon pressure; the abdomen becomes swollen, tense, and tender; sometimes dull, sometimes resonant on percussion. After effusion has taken place it is always dull. This dulness and tension are general when the entire peritoneum is affected, but partial and local when the peritonitis is circumscribed; and at the part affected we may feel a kind of tumor. Vomiting, which is so common a symptom in adults, is not general with children. Rilliet and Barthez met with it only in two cases. Constipation also is very rare; it is more common to find a diarrhœa, which is very distressing, as well on account of the pain which accompanies it, as from the efforts necessary, and the disturbance of the child afterwards. The pulse is small and very quick; the face has an expression of acute distress and great suffering; the tongue is generally moist, but loaded; sometimes clean, sometimes dry and loaded; there is great thirst, and an entire loss of appetite. The skin is hot, and occasionally at the commencement there are rigors, but not always. The breathing is quick, high, and short, not from any thoracic affection, but from the pain caused by the pressure of the descending diaphragm in a fuller inspiration. After

* Wochenschrift für die ges. Heilkunde, 1833, Nos. 17, 18.

† Ibid., vol. ii. p. 66.

‡ Studien in Gebiete der Heilwissenschaft, 2, B. D. S. 190.

§ Archives Gén. de Méd., 1840.

|| Ibid., Aug. Sept. 1846.

effusion has taken place, there may be a mechanical impediment to full and free respiration.

The pain occasioned by any movement gives a sort of fixity to its position and to an intolerance of any change of posture. Dressing, changing napkins, nay, raising the arm even, will give rise to shrieks of agony so acute that a suspicion naturally arises of injury or of some affection of the parts, the moving of which gives so much pain. This symptom, so significant, should never fail to direct our attention to the peritoneum.

In unfavorable cases, these symptoms continue and increase, the pulse becomes insensible, the pain intense, the abdomen very large, the countenance extremely drawn, the anxiety very great, and death soon closes the scene.

In more favorable cases, when the peritonitis is circumscribed, the symptoms diminish in intensity, the tumefaction becomes less and less painful, and finally disappears; the pulse becomes slower, the thirst less, the fever subsides, and the digestive functions are restored; or the symptoms, subsiding to a certain extent, may take on a chronic character.

Another mode of termination occasionally occurs. Dr. West observes: * "The active symptoms diminish in intensity; the abdominal parietes grow thin at some spot, where a passage at length is formed, through which pus is discharged, and recovery sometimes slowly follows; the result of a process precisely analogous to that which nature has recourse to in pleurisy, when she brings about the evacuation of the fluid through an opening spontaneously formed in the parietes of the thorax. An instance of this mode of cure of peritonitis in a child seven years old was related by Dr. Aldis, at a meeting of the Medico-Chirurgical Society, in November, 1846.† A few similar cases may be found in medical journals;‡ and one has come under my own observation in the person of a little girl, whose history I formerly related, as affording an illustration of that rare affection, inflammation of the sinuses of the dura mater."

The duration of the disease is very variable; some cases have proved fatal in twenty-four hours; others have continued for weeks. Rilliet and Barthez have given us the duration of nine cases: "In two, it terminated in one day; in one, in three days; in one, in five days; in one, in twenty-six days; in two, in twenty-six and twenty-seven days; in two, in thirty-six and thirty-seven days.§

There is no essential difference between the symptoms of primary,

* On Diseases of Infancy and Childhood, p. 416.

† Medical Gazette, November, 1846.

‡ Bernhardi in Preuss. Med. Zeitung, No. 10, 1842; and Beyer, Casper's Wochenschrift, 1842, No. 5.

§ Mal. des Enfants, vol. i. p. 564.

and secondary peritonitis; the former is, perhaps, more frequently circumscribed, and the latter, supervening upon other serious affections, hardly permits a hope of cure.

Morbid Anatomy.—The serous membrane is generally found vascular and red, either partially or generally, and principally that portion of it which covers the intestines or their appendages. The subserous cellular membrane or the muscular coat may be infiltrated and softened, so as to be easily torn. In almost every case we find either liquid secretion poured out into the cavity, or false membranes. Sometimes the fluid is serous, clear, abundant, and of a lemon color; in other cases it is troubled, and mixed with albuminous flocculi; or there may be purulent matter, thick, yellow, or greenish yellow. The quantity varies from a cupful to several pints. The purulent matter is generally found in the pelvis; and according to the quantity, the fluid will distend the abdominal cavity more or less completely. False membranes generally coexist with effusion, slight, thin, and elongated, or in the form of thin, soft gelatinous layers, of a whitish or yellowish color, but seldom very firm or thick; they unite the convolutions of the intestines, more or less filling up the interstices, and, if the disease be prolonged, forming adhesions between different parts, and undergoing gradually the same sort of transformation we noticed in pleurisy.

In one-third of M. Thore's cases, evidences of pleurisy were also discovered.

Causes.—Any of the ordinary exciting causes of inflammation may give rise to peritonitis, exposure to cold or wet, falls, blows, &c.

Or, it may be the consequence of a surgical operation, and occasionally it follows the perforation of the gall bladder, the stomach, or intestines. Thus, Rilliet and Barthez state that in one case it was the result of tapping; in another, of a fall; in a third, of the rupture of the gall-bladder; in a fourth, of ulceration perforating the intestines.*

Again, it may be a secondary attack, occurring in the course of other diseases, as ascites, typhoid fever, scarlatina, or tubercles. In seventeen out of M. Thore's sixty-three cases, the peritonitis followed on erysipelas, and in four, on phlebitis of the umbilical vein.

Diagnosis.—1. Acute peritonitis is more likely to be confounded with enteritis or entero-colitis than with any other affection; in both there is pain and tension of the abdomen, with vomiting and diarrhoea; but in peritonitis the pain is far more intense, the tenderness far more acute: the aggravation of suffering by the least movement; the drawn, anxious face, the quick pulse, and the fluctuation in the abdomen, are unlike the characteristics of enteritis.

2. The localized peritonitis has some resemblance to the symptoms of abscess in the iliac fossa; but the latter may be distinguished by the

* Mal. des. Enfants, vol. i. p. 568.

slowness with which the tumor is formed, its defined and limited seat, its progress, the slight degree of fever, and by its final evacuation, internally or externally.

Prognosis.—Nothing can be more serious than the prognosis; peritonitis following perforation is almost necessarily fatal. Secondary peritonitis is so grave an addition to any other disease, that we can hardly hope for the child to escape; and the same may be said of general peritonitis; there is no more mortal disease. The only cases in which there is much chance of recovery, are those in which the inflammation is partial, limited to one spot, and moderate in degree.

Treatment.—The indications of cure are simple enough; the only difficulty is to fulfil them. We must first attempt to relieve the inflammation by antiphlogistic treatment; and for this purpose, unless the child be greatly exhausted by previous disease, a number of leeches, large in proportion to the age of the child, should be applied to the abdomen, or blood taken from the arm. Unless we can thus make an impression upon the disease at an early period, there will be little chance of success, and therefore we must act promptly and boldly. More moderation will be requisite when the disease is secondary and the child reduced, but still we must venture to leech, if we would hope to save the child, and to repeat the leeching according as the disease requires it and the patient will bear it. After the leeches fall off, a warm, light poultice should be applied, and repeated every two hours, if the weight of it do not cause distress, in which case we must substitute frequent fomentations.

Next to bleeding, the most important remedy is mercury, given so as to affect the constitution, as indicated either by tenderness of the gums or mercurial diarrhœa. I have generally found frequent small doses of calomel better than larger ones, and in conjunction with mercurial inunction more effective than alone. For example, to a child of two years old, half a grain of calomel, with a grain of the pulv. cretæ c. opio, may be given every two or three hours, and at the same time the abdomen smeared thickly with ung. hyd. fort., over which the poultice may be applied, or the inside of the thighs rubbed with the ointment; or we may adopt Sir B. Brodie's method, and apply a flannel bandage, smeared with the ointment, around the thighs or legs. But if diarrhœa be present, we may have to modify this plan, and either diminish the dose of calomel or increase the opium, or substitute for it the hyd. c. cretâ, or perhaps content ourselves with the external use of mercury only.

Next to calomel, perhaps the most useful remedy we possess is opium in peritonitis, as Drs. Graves and Stokes have shown; and although more caution will be necessary with children than with adults, yet the effects upon the disease are equally satisfactory. It may be given in combination with calomel or gray powder, if they can be borne, but if not it may be continued alone, with benefit to the diarrhœa as well as the inflammation of the serous membrane.

If there be obstinate constipation, of course purgatives must be given; but we must take care that we do not ourselves render the exhibition of calomel impossible by exciting too much action of the bowels. In general, I much prefer trusting to the calomel acting sufficiently upon the bowels as well as upon the constitution. Moreover, if the peritonitis be the result of perforation of the intestine, it will be of great consequence to suspend the action of the bowels, and to cause constipation, so that instead of purgatives we must give opium and astringents.

But the remedies I have enumerated are not merely calculated to fulfil the first indication; they meet the second, which is to remove the results of inflammation, at a more advanced period, by increasing absorption; and the third, that of preventing the further escape of matters from the intestines into the cavity of the peritoneum.

I have said nothing as yet of blisters, because they are unsuitable at first; but, after due leeching, when the first acuteness of the attack is over, and, at a later period, when effusion has taken place, they are highly useful; and I have found more benefit from small ones repeated than from large ones. Warm baths are occasionally beneficial, and always soothing, if the child be not too weak.

The diet of the patient in primary peritonitis must be rigorously restricted: a little milk and water or whey, and a little toast, will be sufficient. In secondary peritonitis, however, though it must be moderate, we must have some regard to the exhausted condition of the child, and must support the strength, in order that we may have a chance of curing the disease. In addition to milk in any form, therefore, we shall have to allow weak chicken broth or beef tea.

2. *Chronic Peritonitis*.—Slight allusions to this form of disease may be found in some of the writers on diseases of children, and fuller details by Baron,* Abercrombie,† Gregory,‡ Billard, Rilliet and Barthez, Sir H. Marsh, West, &c.

M. Billard gives a short notice of chronic peritonitis, and relates the following case:—"Josephine Perrine, æt. ten months, of a good size, but thin and spare, had already cut the two incisor teeth of the lower jaw, when she was suddenly seized with dyspnœa. The child, usually lively, had become morose and fretful. She entered the infirmary on the 22nd January, 1826. The abdomen was tympanitic, the respiration a little difficult, and was indistinctly heard at the upper part of the right side of the chest; the tongue was dry, pulse small, skin burning; she was affected with diarrhœa, consisting of green and

* On Tubercle, &c., p. 131.

† Diseases of the Abdominal Viscera, p. 191.

‡ Med. Chir. Trans., vol. ii. p. 259.

mucous fæces. On the 23rd, the diarrhœa became more light colored. On the 24th, the same general symptoms, but without fever; tension of the abdomen, facies hippocratica, forehead wrinkled. On the 26th, deglutition difficult, retching whenever drinks were given, very feeble. The isthmus of the fauces appeared of a bright red. Death took place on the morning of the 27th. "*Post-mortem examination*.—Body considerably emaciated; general paleness of the integuments; nearly two ounces of yellow serosity were found in the abdomen. Numerous and firm adhesions existed between the transverse portion of the colon and the great curvature of the stomach. Some of the convolutions of the small intestines were likewise adherent, but in a less solid manner. The mucous membrane of the stomach was of a pale rose color; that of the small intestines was covered with red striæ, and a number of slate-colored spots existed in the whole length of the colon, &c."*

Sir Henry Marsh published some interesting cases of this disease in 1843, to which I had the honor to add some supplementary remarks, the substance of which is here reproduced.†

I shall now shortly detail the first case, which occurred to myself, and for the diagnosis and successful treatment of which I am under obligation to Sir H. Marsh. Mary —, æt. six, a healthy child, of delicate, fair complexion, fair hair, &c., about December, 1840, was observed to be somewhat unwell; she suffered from occasional attacks of diarrhœa, which, after a time either subsided or were relieved by the usual remedies. Occasionally, she complained of shooting pains through the abdomen, coming on irregularly, and lasting but a short time, but not accompanied with tenderness or swelling. Her appetite became delicate and fastidious, with some thirst. The pulse was scarcely quickened; her countenance became pale, and she became thin. Matters continued in much the same state for about a month—occasionally attacks of pain and diarrhœa, with loss of appetite, &c.—but, after this time, I observed that the abdomen became gradually swollen, with a distinct sense of fluctuation, uneasiness on motion, but no pain on pressure. The pulse rose to 130, and there was a certain amount of fever, especially in the evening, with an occasional rigor. The emaciation had increased, and the other symptoms continued much the same. By Sir H. Marsh's advice, hyd. c. cretâ, gr. ij, P. Jacob. gr. j, was given every four hours. The abdomen was well rubbed with ung. hyd. fort. and she took a warm bath at bedtime. This treatment was continued a fortnight without any manifest improvement, and without the constitution being affected by the mercury. The transient pain, the swelling with fluctuation, the quick pulse, the fever, with exacerbations in the afternoon, and drowsiness, all continued. The appetite was rather improved. She had become by this

* Mal. des. Enfants, and Trans., by Dr. Stewart, p. 354.

† Dublin Journal, March, 1843, p. 1.

time both thin and weak, was very unwilling to exert herself, and complained of abdominal uneasiness upon moving about. A blister was then applied to the upper part of the abdomen, and dressed with ung. hyd.; frictions with a scruple of the same ointment were used twice a day, and the internal medicines omitted. Under this treatment she shortly began to amend. The pain returned less frequently, and at length ceased; the abdomen gradually though slowly diminished in size, until fluctuation was no longer perceptible; the bowels became regular, the pulse tranquil, the fever disappeared; in about six weeks from the commencement of the treatment she was convalescent. I have since seen several cases of the same kind which were benefited by similar treatment.

Chronic scrofulous peritonitis, with effusion, may follow acute inflammation, or it may occur without our being able to recognize any preceding acute stage, coming on so gradually, in fact, that we may not be aware of the nature of the disease until it is fully developed. As M. Dugès observes, "there may be occasional pains, colics, irregular attacks of diarrhœa, emaciation, paleness, for weeks or even months before the disease is fully established.*" From the earlier and more prominent symptoms being referable to the mucous membrane of the intestinal canal, the real affection may be overlooked, and the fatal results attributed to the diarrhœa. It may also be either *primary* or *secondary*, more frequently the latter.

Symptoms.—From what has already been said, it will be gathered that the mode of invasion varies widely. In one class of cases the patient labors under diarrhœa for a considerable time, with or without pain; the appetite is pretty good, the temperature natural, and the pulse quiet; but at length, it may be weeks or months, we hear complaints of a sensation of pricking, or of paroxysms of pain, and a feeling of tightness in the abdomen, which, upon examination, is found to be more or less swollen. In other cases there is a certain amount of pain from the beginning, occurring in paroxysms, with perfect intervals, and though at first limited to one part of the abdomen, yet by degrees spreading over and occupying the whole.

Again, as Dr. Abercrombie remarks, "In a very important modification of the disease there is no complaint of pain; the patient merely speaks of a feeling of distension, with variable appetite and irregular bowels, and with these complaints becomes progressively emaciated. In many cases, indeed, the early symptoms are so slight that no attention is paid to them until the emaciated appearance of the patient excites alarm. The abdomen, on examination, is probably found tumid, and in some degree tender in various parts; and, upon questioning the patient, it is found that there has been some degree of pain for weeks and months. In other cases there has been no actual pain, but a feel-

* Dict. de Med. et de Chir. Prat., vol. xii. p. 295.

ing of tenderness, which gives rise to uneasiness on pressure, or when any part of the dress is tight over the abdomen; but in many cases the disease steals on to an advanced period without any complaint of tenderness or pain."* The observations of M. Andral† are confirmatory of Dr. Abercrombie's remarks; Dr. Gregory, however states that tenderness on pressure is present from the commencement.‡

So much for the mode of invasion. Sooner or later, in the majority of cases, the patient complains of pain, occurring most frequently in paroxysms of varying intensity and duration, with intervals of complete relief; beginning in some part of the abdomen, and gradually spreading over the entire. In the words of Dr. Gregory, "the attacks of acute pain occur in paroxysms at first, not oftener perhaps than once or twice in a day; but, as the disease advances, they increase in frequency, and at the same time in violence. I have seen them happen as often as once in ten or fifteen minutes; they do not last long, and immediately after an attack the child appears lively, as if nothing ailed it. There is frequently, perhaps generally, a certain amount of tenderness on pressure, especially at the part to which the pain is at first limited, though it is not very remarkable in many cases. The patient almost always complains of uneasiness on attempting to walk or stand, and in some cases finds it impossible to stand erect.

After an uncertain interval, the patient complains of a feeling of distension and requires the dress to be left loose: and then, if an examination be made the abdomen will be found more or less swollen. Percussion generally yields a dull sound, but not always, for when the bowels are much disordered, they sometimes become tympanitic. Fluctuation is, I think, perceptible in all cases, if the examination be carefully made; but it requires especial care with young children to guard against the action of the abdominal muscles, and the natural elasticity of the integuments. The best mode is to lay the child on its back, and accustom it for a short time to the presence of the hand upon the abdomen; then, placing one hand, with the fingers separated, on one side, and percussing very gently with the other, the muscles will not be excited into action; and, if fluctuation be perceptible with the second or third finger, we may be certain of the presence of fluid; for the pressure of the forefinger upon the skin effectually arrests the vibration which results from its elasticity. I have dwelt rather minutely upon the mode of examining the abdomen, because in many cases, from the paucity and obscurity of the symptoms, our diagnosis must chiefly depend upon the presence or absence of fluctuation. The enlargement of the abdomen is not always equable; in some cases,

* Diseases of the Abdominal Viscera, p. 192.

† *Mal. de l'Abdomen*, Clin. Med. vol. iii. p. 587.

‡ *Med. Chir. Trans.*, vol. ii. p. 263.

especially in the commencement, the umbilical region protrudes. As the effusion increases, the entire abdomen enlarges, loses its softness, and becomes tense and hard, though occasionally unequally so. The skin of the abdomen is hot and dry, and has the appearance of being stretched and diminished in thickness. In very chronic cases large blue veins are visible traversing the abdomen. When the mesenteric glands are diseased, it is possible in some cases to detect their enlarged condition, by making careful examination at an early period, before the abdomen is much distended.

In some rare cases the intestinal canal preserves its integrity for a long time; the tongue is pretty clean, the appetite much as usual, the bowels regular, or perhaps rather constipated; but in the large majority of cases, we find the tongue white, loaded, and flabby; more or less thirst; the appetite irregular and fastidious, sometimes increased, more frequently impaired or lost altogether; the bowels relaxed or constipated, perhaps alternately; the stools fœtid and of a whitish-brown or bluish color. "At first," says Dr. Gregory, "the stools are green, slimy, or fœtid; but when the disease has existed about six weeks or two months, they will be found to consist of a whitish or whitish-brown matter, of the consistence of thin pudding; nor do the evacuations differ more in *quality* than they do in *quantity* from those in health. The quantity passed by the child in twenty-four hours, and that without the aid of medicine, is often enormous; and I have seen it taken notice of by the parents as greatly exceeding what the child could have taken in by the mouth." This state of the bowels frequently continues for six weeks or two months, the body of course wasting the whole time, until diarrhœa at length comes on, attended with petechiæ, which, in the course of three or four days, puts a period to the child's life."

When the effusion is considerable, the breathing may be rendered rapid and laborious, owing to the pressure upon the diaphragm. There may be another cause for the dyspnœa, however, for, as in one of Sir H. Marsh's cases, it sometimes happens that the serous membrane of the chest is affected with effusion into its cavity. At first the pulse is scarcely altered; but, as the disease advances, it increases in frequency, varying from 100 to 140, but is diminished in strength and fulness. The heat of skin is increased. In almost all cases, when the disease is fully established and the fever marked, there are distinct evening exacerbations of a hectic character, during which the pulse rises, the temperature augments, the face is flushed; there is much thirst, and the urine is high colored, &c. After this state has continued an hour or two, it gradually subsides. Generally speaking, throughout the course of the disease the secretion of urine is diminished in quantity. It is hardly necessary to add, that so formidable and long continued a disease is attended with great emaciation and exhaustion. As the disease progresses, the local symptoms are aggravated; the quick pulse

and fever with exacerbations, more remarkable; the weakness and incapability of exertion more extreme; the patient, in short, is utterly worn out.

Terminations.—The course of the disease is generally very long; it may be prolonged for several months, and then may terminate variously.

1. In *resolution*. Under proper treatment the inflammation may be subdued, and the effusion absorbed, and this termination is the more practicable the less the mesenteric glands are affected. In such cases we find the unhealthy condition of the intestinal canal gradually corrected, the appetite return, and the fecal evacuations become natural; the pulse diminishes in frequency, the fever and exacerbations cease. The last symptom remaining is the abdominal distension; but this, too, gradually subsides until fluctuation can no longer be detected. These successful cases, however, are not the most common.

2. In a *circumscribed collection of the effused fluid and its final evacuation*, with more or less subsidence of the original affection. Under such circumstances patients have been known to recover. Dr. Burns mentions a case of this kind;* and Dr. Abercrombie states that the matter may make its way through the abdominal parietes, or the inguinal ring.† An interesting case of this termination was related to the Surgical Society, by Dr. O'Reilly. Such cases, however, are very rare.

3. In *death*. The majority of cases terminate thus at different intervals from the commencement of the attack. Instead of diminishing, the symptoms progressively increase in intensity. The abdomen is very tense and tender, the fever high, the pulse very quick and feeble, the thirst considerable, the diarrhœa persistent, the exacerbations severe, the emaciation and exhaustion extreme. The countenance becomes sunken, the extremities cold, the surface covered with a clammy sweat, and occasionally dotted with petechiæ, and, at length, after a prolonged period of suffering, death closes the scene. In some cases the disease is brought to an earlier termination by ulceration and perforation of the intestines, which convert the chronic peritonitis into acute.

Morbid Anatomy.—Occasionally the vessels of the peritoneum are injected, though sparingly; there is more or less serum effused into the abdominal cavity, with shreds of lymph floating therein.‡ The intestines are more or less agglutinated together, and often thus assume the appearance of sacs of matter. Where there has been perforation of the intestines, we find fecal matter mixed up with the serum, and can

* Midwifery, p. 811.

† Diseases of the Abdominal Viscera, p. 195.

‡ Burns's Midwifery, p. 811. Denis, Mal. des Enfants Nouveaux-nés, p. 119.

generally detect the communication with the intestine through which it has passed. The peritoneum itself is often thickened, and coated with a layer of lymph; sometimes it is studded with miliary tubercles, or has tubercular matter deposited upon it. In some cases the mucous membrane is intact, in others, ulceration has advanced to different stages. The mesenteric glands may be free from disease, or they may be enlarged, and contain tubercular matter. Dr. Abercrombie states as the result of his experience, that "on dissection the bowels are generally found more or less extensively glued to each other, and to the parietes of the abdomen, and the omentum is often involved in the disease. There is sometimes ulceration of the mucous membrane, and not unfrequently the peritoneum is in many places much thickened, and studded with small tubercles; in some cases again there is great thickening of all the coats of the intestines at particular parts. In many cases there are left, amid the adhering portions of the intestines, cavities full of purulent matter, which is generally of an unhealthy or scrofulous character. There is frequently disease of the mesenteric glands of the liver or lungs."* Dr. Gregory observes that, "on cutting through the parietes of the abdomen, all traces of abdominal cavity will be wanting. The mesentery, bowels, and peritoneum lining the parietes, will be found united together into one mass. The peritoneum, in all its duplicatures, appears thickened, and on cutting through the diseased mass, very large quantities of scrofulous matter will be found. The mucous membrane of the bowels, particularly of the small intestines, appears ulcerated in various places, and at these points of ulceration the convolutions of the intestines communicate, so that instead of forming one line of canal, as they will continue to do even in advanced stages of chronic peritonitis, they constitute a mass of tubes communicating freely with each other, and with the thickened and ulcerated peritoneal membranes by innumerable openings. The matter which will be found both within and without the mucous membrane will be observed to correspond exactly with that which was passed during life by stool."†

Causes.—Various exciting causes have been mentioned as giving rise to the disease, such as bad diet, cold, privations, excesses, dentition, constipation, &c. and doubtless with truth; but nevertheless, in the majority of cases, it will be extremely difficult to say exactly what is the exciting cause. In the cases which have fallen under my own observation, it appeared to be the result of an extension of irritation from the intestinal mucous membrane. It also occurs as one of the sequelæ of febrile diseases, such as scarlatina, measles, &c. It may be worth remarking, that none of the children in whom it occurred at an early age were born of mothers who had suffered from puerperal fever.

* Diseases of the Abdominal Viscera, p. 193.

† Med. Chir. Trans. vol. ii. p. 266.

Diagnosis.—When pain and swelling of the abdomen, with fluctuation, are present, the diagnosis will be easy; but in those cases in which there is no pain, and but slight tenderness, with little disorder of the digestive organs, there may be great difficulty. Our principal guide is the enlargement of the abdomen, which ultimately always occurs, and the fluctuation, which, by a little care, may generally be perceived. When there is much dyspnœa, or when the diarrhœa is severe, we must be on our guard against supposing the disease limited to the chest or mucous membrane of the intestines. We know that both may be seriously involved, concurrently with the peritoneal membrane. The same may be said of the mesenteric glands; they may also be diseased; but when they are affected alone, we shall find neither the abdominal swelling (at least to the same extent) nor the fluctuation.

Prognosis.—The prognosis, in the majority of cases, is unfavorable. Where the peritoneum alone is affected, the patient has certainly a chance of recovery; but if the mesenteric glands, or the mucous membrane of the intestines, or the pleura be involved, the case will probably terminate unfavorably.

Treatment.—The treatment usually recommended is comprised in a few lines—short in proportion to its hopelessness. Leeches to the abdomen, fomentations, purgatives, of which calomel forms one of the ingredients, alteratives sometimes, tonics, chalybeates, absorbents, &c. Such is the catalogue usually given. The question, however, deserves a little more detail, inasmuch as a certain number of the cases are curable, if we are called in reasonably early.

General bleeding, I believe I may say, is never required; but when the pain is distressing, especially if there be parts of the abdomen tender on pressure, we may afford relief by the application of a few leeches; to be repeated, if necessary. The abdomen should be fomented with a decoction of poppy heads, twice a day, or oftener, if the paroxysms of pain be frequent; or a piece of lint wet with laudanum may be laid over the abdomen; and every night, or every other night, the patient should take a warm bath.

If the bowels be confined, a dose of castor oil or Gregory's powder, must be given occasionally; but if diarrhœa be present, it may generally be checked by the pulv. cretæ cum opio, or any other astringent combined with an anodyne. Dr. Gregory advises laudanum for this purpose.

But our principal reliance is upon mercury, given so as to affect the gums if possible. I believe that the credit of thus administering mercury in this disease is due to Sir Henry Marsh, as I have found no allusion to it in any authority. It may be exhibited internally or by inunction; in many cases the latter is preferable, as when diarrhœa occurs, the bowels are too irritable. A scruple of the strong ung. hyd. should be gently rubbed in over the abdomen, night and morning, and

continued until the gums are touched, or the disease shows signs of yielding to the treatment.

Blisters to the abdomen are very useful; they should be small, and applied successively to different parts, and dressed with the blue ointment.

Should the disease give way, the moment the febrile action ceases will be the proper time to commence the use of tonics; and the diet, which up to this time should be bland and unstimulating, though nutritious, may consist of broths, meat and a moderate quantity of wine or porter.

During convalescence the patient must be confined to the house at first, and only by degrees allowed to take air and exercise. The clothing should be warm, with flannel next the skin. At a more advanced period of convalescence a removal to the country will be of essential benefit.

SECTION V.

DISEASES OF THE SKIN.

My object in the present section is simply to give a brief sketch of those eruptions which occur most frequently in children. Although I agree with those who object to many points of the classification of Dr. Bateman, yet, in order to avoid confusion, I think it better to make use of his terminology, and, to a great extent, of his arrangement, specifying any points of difference as they arise.

That the varieties of cutaneous eruptions are caused by the difference of the tissues involved, and the varying amount of inflammation, I fully believe, with perhaps one or two exceptions.

Commencing, therefore, with the slightest of these diseases, we shall consider successively the papular, squamous, vesicular, and pustular diseases in order. For fuller details I must refer my readers to the works quoted below.*

* Willan on Diseases of the Skin. Bateman on Cutaneous Diseases. Bielt, *Abregè pratique sur les Maladies de la Peau*, by Cazenave and Schedel. *Leçons sur les Mal. de la Peau*, par P. L. A. Cazenave. Eruptions of the Face, Head, and Hands, by Dr. Burgess. Portraits of the Diseases of the Scalp, by W. C. Dendy. On Diseases of the Skin, by Dr. Neligan.

CHAPTER I.

STROPHULUS. PRURIGO. PITYRIASIS. ROSEOLA.

I. STROPHULUS, OR RED GUM.

THIS is ordinarily the earliest eruption to which infants are liable ; it is very commonly seen a day or two after birth, and from time to time during the first year of infantile life. It appears to arise from the irritability of the skin, and its sensibility to reflex irritations ; thus at an early period it seems to be owing to the assumption of their proper functions by the stomach and intestinal canal ; at a later period, to some disorder of these organs, or to dentition, &c.

Willan and Bateman have described five varieties : the *strophulus intertinctus* is characterized by papulæ of a vivid red color, situated most commonly on the cheeks, forearms, and back of the hands, but sometimes universally diffused. They are usually distinct from each other, but are intermixed with red dots or stigmata, and often with larger red patches, which have no elevation. Occasionally a few small vesicles appear on the hands and feet, but these soon desiccate without breaking. The other varieties are mere modifications of this one ; sometimes we find minute, hard, whitish, elevated specks mixed with it (*strophulus albidus*) ; or the eruption is more extensive and general, of a more vivid red, and sometimes in large irregular patches (*s. confertus*) ; or it occurs in small circular patches or clusters of papulæ, arising and exfoliating on different parts of the body, (*s. volaticus*) ; or it may consist of large papulæ, with a smooth shining surface, without inflammation around the bases (*s. candidus*).

Very little *treatment* is necessary, and no local applications beyond daily and careful ablution, or an occasional warm bath. In young infants, as the digestive system becomes used to the exercise of its functions, less and less cutaneous eruption of the skin is excited, and the disease subsides of itself.

When it proceeds from morbid irritation of the bowels, however, it will be relieved by a few grains of gray powder with rhubarb ; or if the bowels are too free, a little chalk mixture, with a drop or two of laudanum to the ounce.

If the teeth are troublesome, and the gums swollen or inflamed, it will be necessary to lance them freely, so as to remove the distress.

II. PRURIGO.

This disease is characterized by an eruption of papulæ of the same color with the surrounding cuticle, accompanied with severe itching. There is but one variety, the *Prurigo mitis*, which frequently affects young persons. It is accompanied by soft, smooth, papulæ, somewhat larger and less acuminate than those of lichen, and seldom appearing red and inflamed, except from violent friction; hence an inattentive observer may overlook the papulæ altogether, more especially as a number of small thin black scabs are here and there conspicuous, and arrest his attention. These originate from the concretion of a little watery humor, mixed with blood, which oozes out when the tops of the papulæ are removed by the violent rubbing or scratching which the severe itching demands. This constant friction also sometimes produces inflamed pustules, which are merely accidental, however, when they occur at an early period of the complaint. The itching is much aggravated both by sudden exposure to the air and by heat; whence it is particularly distressing when the patient undresses himself, and often prevents sleep for several hours after he gets into bed.

It appears to be most frequent in spring or the beginning of summer, and certainly with children occasions great distress. It is quite distinct from scabies or itch, and yet, if neglected, it is quite possible that it may degenerate into that complaint.

Treatment.—The tepid bath, or frequent ablution with warm water, appears to be almost the only local remedy necessary, though at first the disease seems rather aggravated than relieved. I have found the addition of sulphuret of potash to the warm water afford great relief to the itching, but I think the most effectual remedy for it is the zinc cream, which consists of white wax 4 oz.; spermaceti 4 drachms; almond oil and distilled water 16 oz.; otto of roses one drachm, and oxide of zinc 16 drachms. The wax, spermaceti, and oil should be melted together in a water bath, and poured still hot into a mortar previously heated, and the water added by degrees, whilst the mixture is assiduously beaten with a twig until it assumes a granulated appearance. The oxide of zinc finely powdered may then be added, and the otto of roses. I have given this formula in full because I have found the cream afford great relief from the itching in all the eruptions of children in measles, scarlatina, &c. Internally Dr. Bateman recommends the use of sulphur, alone or combined with soda or nitre, and that this should be followed by the mineral acids.

We must take care to regulate the bowels; if they are not too free, the hyd. c. cretâ, with rhubarb and a little carbonate of soda, will act kindly and beneficially.

III. PITYRIASIS.

This eruption is characterized by irregular patches of thin scales, which exfoliate and re-form, but which neither form crusts nor are accompanied with excoriation. The first variety of Bateman (*p. capitis*) is that with which we have chiefly to do. It is observed on the head of many, if not most infants, in the form of *dandriff*, as it is called, and appears rather as an excess of cutaneous secretion than as a disease. It is most common on the top of the head, but it often extends to the forehead, where we may see a band of small whitish scales, easily removed by friction; but on the top of the head, and at the occiput the scales are larger, and, if neglected, rather resemble a large, dirty patch. Among the poor this state of the scalp is almost universal, and, I do not doubt, forms an appropriate preparation for more troublesome eruptions in that region. Even with infants who are carefully tended, it requires patience and constant watching to prevent the formation of a layer of scaly secretion.

Dr. Neligan remarks: "If we examine the condition of the scalp in pityriasis capitis, the surface is found to be closely covered with the imbricated scales, with small intervals here and there; the skin of the unaffected parts presenting a smoother or more polished appearance than natural. On removing one of the scales we find that the spot on which it is seated is soft, and that another fine scale may be removed from it; and it is not until after the removal of several scales, each finer than the preceding, that we arrive at the reddened and inflamed surface of the scalp, which is somewhat depressed."* The principal annoyance which it occasions is the itching; and the efforts of the infant of course tend to increase the inflammation and irritation.

Treatment.—Daily and careful ablution of the head is necessary with all infants, and especially when this disposition to excessive secretion is manifest; but I have certainly seen the disease aggravated by the frequency and profuse use of soap, which acts as an irritant to the tender skin of the infant. Very little, if any, soap should be used; if warm or cold water be not sufficient, oatmeal and water, or a little of the yolk of egg, may be employed; and after the head is dry a small quantity of very thin oil may be applied; or, if the skin appear red, a lotion of almond milk (ʒiv.) and acetate of lead (gr. xij.) For the ordinary dandriff, or for this disease, when it has so far subsided, I have found a lotion of two drachms of borax to a pint of water very useful.

At a more advanced age soap may be used more freely, followed by the same oily or soothing applications, or an alkaline or spirituous

* Dublin Journal, August, 1841, p. 41.

lotion, according to circumstances. It will be generally advisable to remove the hair, or to keep it very short, and especially if its growth appear to have been injured.

IV. ROSEOLA.

This eruption is a rose-colored efflorescence, not contagious, and without either wheals or papulæ. Bateman describes seven varieties; but we are principally concerned with two of them, the *roseola autumnalis*, which occurs in children in the autumn, in distinct circular or oval patches, which gradually increase to about the size of a shilling, and are of a dark, damask-rose hue; they appear chiefly on the arms and continue about a week, sometimes terminating by desquamation: there is little itching, tingling, or constitutional affection connected with this efflorescence, and its decline seems to be expedited by the use of sulphuric acid internally: and the *roseola infantilis*, which is a closer rash, with fewer interstices, sometimes disappearing after a few hours, or recurring and disappearing for days together, occupying sometimes a limited space, in other cases being very general, and accompanied with smart though temporary febrile action. It appears to be the result of intestinal irritation, or of dentition, and it is not uncommon in the course of fevers. Previous to the eruption of small-pox, there is an eruption of roseola, and a similar one after vaccination; but these are of trifling importance, and indeed I should hardly have mentioned roseola at all but for its resemblance to measles or scarlatina in some cases, but particularly to measles. I have no doubt but that some of the cases, in which it is supposed that measles or scarlatina has occurred twice in the same child, were in one instance cases of roseola.

There is sometimes considerable febrile action before the eruption, and the eruption may present a striking resemblance to either of these diseases; but in general the fever is infinitely less, and the eruption dies away much sooner. Moreover, there is less lachrymation and suffusion of the eyes, rarely any bronchitic affection or sore throat; and, finally, it does not run through the family.

Treatment.—The removal of the irritation, caused by dentition or disordered stomach and bowels, is in general quite sufficient to cure the affection, which, in itself, is of no moment.

CHAPTER II.

HERPES. ECZEMA. RUPIA

I. HERPES.

WE now pass on to a different class of diseases, in which the cuticle is not merely prominent, but in which it is separated from the cutis, and raised above the level of the surrounding parts by the effusion of serum. The characters of a vesicle, as distinguished from a pustule, are thus stated by Bateman: "It is a small orbicular elevation of the cuticle, containing lymph, which is sometimes clear and colorless, but often opaque and whitish, or pearl-colored. It is succeeded either by scurf or by a laminated scab."

Of that form of disease which I shall first notice, *Herpes*, Dr. Bateman makes five varieties: *H. phlyctenodes*, *H. zoster*, *H. arcuatus*, *H. labialis*, and *H. præputialis*: but as the majority of these affect children only incidentally, I shall enter into details concerning one species only, the *herpes arcuatus* or *ringworm*, which Dr. Neligan considers to be the true ringworm of the scalp. As we generally see it, it appears in small circular patches, with the vesicles best marked at the circumference; but this I believe to be because the disease, which commences by a single small vesicle, spreads concentrically, the centre healing whilst the circumference spreads and enlarges by successive crops of vesicles, producing in a short time the appearance of a ring. The vesicles are very minute, and in the course of a week form scabs, which fall off, leaving the cuticle underneath red for some time. Fresh vesicles may form, dry up, and the scabs fall; or the original circles may remain red, and the cuticle throw off scales merely. Other circles meanwhile may form, and thus spread on the upper part of the body, the arms, chest, back, face, and scalp. There is no febrile disturbance attendant upon this eruption, nor any inconvenience beyond a disagreeable itching and tingling in the patches.

Dr. Bateman has noticed another form of herpes, "in which the whole area of the circles is covered with close-set vesicles, and the whole is surrounded by a circular inflamed border. The vesicles are of a considerable size and covered with transparent lymph. The pain, heat, and irritation in the part are very distressing, and there is often a considerable constitutional disturbance accompanying the eruption. One cluster forms after another in rapid succession on the face, arms,

and neck, and sometimes on the day following, on the trunk and lower limbs. The pain, feverishness, and inquietude do not abate till the sixth day of the eruption, when the vesicles flatten, and the eruption subsides. On the ninth and tenth days a scabby crust begins to form on some, while others dry and exfoliate; the whole disease terminating about the fifteenth day." Dr. Bateman seems to doubt whether herpetic ringworm is contagious, because the other herpetic eruptions are not. M. Biett lays great stress upon its not being contagious, upon its vesicular character, and upon its not injuring the hair, as distinguishing it from *porrigo scutulata*.* Dr. Neligan has no doubt of its contagiousness; he regards it as completely proved as that of smallpox. It certainly attacks more than one member of a family or school consecutively, and in some cases I have thought was undoubtedly communicated from one child to another.

Treatment.—The hair must be cut short, and if there be much irritation, soothing applications are to be applied; if not we may at once apply our special remedies. Strong astringent applications seem to be the best: the solution of salts of iron, copper, zinc, or of borax, alum, &c. are very useful. The tincture of the muriate of iron I have found very useful: the tincture of iodine or nitrate of silver will cure it equally well. Common ink (which contains sulphate of iron, and galls) is a very favorite popular remedy.

M. Biett speaks highly of lotions of carbonate of soda or potash; and his experience is confirmed by Dr. Neligan, who recommends the use of both ointment and lotion of these alkalies; and if a more stimulant treatment be necessary, a dilute citrine ointment.

The stomach and bowels should be carefully regulated, and the skin kept in a state of great cleanliness.

II. ECZEMA.

The varieties of eczema described by Dr. Bateman are not at all peculiar to children, and are not mentioned as attacking the scalp. But Dr. Neligan has described a disease under the name *eczema capitis*, which is by no means uncommon. It is essentially a vesicular eruption, but in the different stages it presents varied appearances, because probably of the increase of the inflammation from rubbing, scratching, &c., so that it often resembles the eczema impetiginodes of Willan and Bateman, an intermediate stage between a vesicular and pustular disease.

The appearance of the eruption is preceded by itching, tingling, and heat; then the minute vesicles are seen crowded together in irregular patches, or scattered over a large surface. They usually appear first behind the ear, close to the edges of the scalp, from whence they spread

* *Mal. de la Peau*, by Cazenave and Schedel, p. 110.

over the ear itself and the scalp. "The interspaces between the vesicles and the whole of the scalp, on which they are seated, is red and inflamed; in most cases the vesicles are so minute as to be scarcely recognizable, or at least are not seen by the physician, until they have burst, and given exit to a copious exudation of a serous fluid, by which the roots of the hair are cemented together. In the acute form of the disease the serous exudation continues for a long time, and is a most troublesome symptom: but in the chronic forms—and some cases assume a chronic character almost from the first—it rapidly dries into furfuraceous scales, which are pushed forward by the hairs as they grow. With the progress of the affection, the appearance of the diseased surface varies much; sometimes it is scarcely, if at all elevated above the healthy parts, and is only to be recognized by the watery exudation which keeps the hairs in a constantly moist state. In other cases, the scalp is raw or excoriated, and secretes a thin whitish pus, which dries into greyish-brown scabs, presenting cracks or fissures through which the inflamed surface is seen. In a third form of the disease, the serous exudation dries rapidly into extremely thin membranous scales, which are readily removable by the slightest friction, but cause much itching; and a fourth variety is characterized by a repeated eruption of minute patches of vesicles, the patches rarely exceeding the size of a small bean, all on the scalp, which pass through the stages of eczema, as witnessed on other parts of the cuticular surface, and disappear in seven or eight days, but to be rapidly succeeded by a fresh outbreak of the disease."* So long as the surface of the cutis remains unbroken, the hair is uninjured; but when the inflammation involves the roots of the hair, or ulceration of the cutis destroys them, the hair is either weakened in its growth or altogether obliterated. Eczema does not appear to be a contagious disease, nor can we name any special cause for it; it may be connected with dentition or intestinal irritation like other eruptions.

Treatment.—I quite agree with Dr. Neligan that more harm than good is done by shaving the scalp, at least in the acute stage of any eruptive disorder. The hair should be cut very close with a pair of fine scissors, and kept very short; this occasions no irritation, and affords sufficient facility for applying remedies, and for keeping the head clean. In no severe or acute case, however, should the head be washed with soap; water alone, or oatmeal and water, will be sufficient. The local treatment will, in the first instance, depend upon the amount of inflammation; if this be great, the first object is to soothe and lessen it by emollient applications, such as poultices, fomentations, or the warm-water dressing. When the surface is less red and angry looking, we may try the alkaline applications recommended by Bielt and Neligan, the carbonate of soda or potash, either in the form of

* Dublin Journal, August, 1848, p. 37.

ointment or lotion. I would wish to impress upon my junior readers the fact that with some children greasy applications altogether disagree, and seem to aggravate the eruption, whilst, with the same children, the same remedies in the form of lotion will succeed perfectly; and as this can be known only on trial, we should change the vehicle if we do not find it answer, before deciding against the remedy. Dr. Neligan forms the ointment of either carbonate by adding from twenty to thirty grains to an ounce of lard, and the lotion by dissolving half a drachm in a pint of rose-water or distilled water. The ointment is to be applied three times a day, and should be washed off every morning with the lotion: if the lotion only be used, it should be applied five or six times a day. The carbonate of soda is preferable when there is much inflammation, as being less irritating than the carbonate of potash. In all cases, Dr. Neligan keeps the child on milk diet during the entire period of treatment.

Dr. Burgess recommends the alkaline lotions instead of any greasy applications, but as he regards eczema as a constitutional and not a local affection, he lays great stress upon "restoring the tone of the system by means of a course of mild tonics and alteratives." If the secretion be abundant, and the parts irritated, he advises barley water with sulphuric acid, (half a drachm of the former to a pint of the latter), commencing with small doses, and taking a little water after each until the stomach is accustomed to the acidulated drink. If these remedies fail, then we may try alteratives, as sarsaparilla, and hydriodate of potash; active purgatives if the patient be strong; and lotions of the nitrate of silver, or the bichloride of mercury. In chronic cases, where some stimulant is required, a very dilute citrine ointment may be used.

I have found singular benefit in all the moist eruptions, where the inflammation is not too great, from the use of black wash; it dries the surface, and forms scabs, which must be carefully removed, in order that the lotion may get at the diseased surface. In some cases, a lotion of acetate of lead in almond-milk, or decoction of poppy-heads, is very soothing. The bowels must be regulated, and in some obstinate cases a few alterative doses of mercury may be advantageously given. M. Bielt recommends acid drinks.

III. RUPIA.

Dr. Bateman states that "rupia is characterised by an appearance of broad and flattish vesicles in different parts of the body, which do not become confluent; they are slightly inflamed at the base, slow in their progress, and succeeded by an ill-conditioned discharge, which concretes into thin and superficial scabs, that are easily rubbed off and presently re-generated."*

* On Cutaneous Diseases, p. 243.

We are only concerned with one of his three varieties, however, the *rupia escharotica*, which appears to be identical with the disease described by Dr. Whitley Stokes, and others, under the name of *pemphigus gangrenosus*. Dr. Bateman says that "it affects only infants and young children when in a cachectic state, whether induced by previous diseases, especially the smallpox, or by imperfect feeding and clothing, &c.; whence, among the poor, where it is commonly seen, it often terminates fatally. The vesicles generally occur on the loins, thighs, and lower extremities, and appear to contain a corrosive sanies; many of them terminate with gangrenous eschars, which leave deep pits."

It is not stated by writers in general to be either a very frequent or fatal affection; yet in Ireland it appears to be both in a very high degree, for I find in Dr. Wilde's Report that in ten years the mortality amounted to 17,779, in the proportion of 100 males to 78.83 females. The country people give it the significant names of "white blister," "eating or mortifying hive," "burnt holes," and among them it appears to prevail as an epidemic occasionally. Dr. Whitley Stokes, who published a valuable paper upon this subject in 1808, states that "the causes of this malady are rather obscure, it seems exclusively confined to children. Dr. Spear observed that it was confined to children of three months and from that to five years, but it has been observed, near Dublin, in children of nine years old. It attacks the finest children in preference: the children of the poor more frequently than those of the affluent: those who live in damp situations seem more particularly subject to it than others. It appears to be infectious, though obscurely so in general, but in the year 1800 Dr. Spear observed it to spread epidemically."* MM. Cazenave and Schedel describe it as commencing with livid spots, slightly prominent, upon which the epidermis is soon elevated by the effusion of serum until they form large bullæ, flat, and of irregular form, surrounded by a livid circle. These vesicles break, and expose irregular ulcerations, varying in depth and extent, with red border and unhealthy surface. There is severe pain, much fever, sleeplessness, and, when the disease is extensive, death may occur in a week or two.

In one or two cases which came under my care I was informed that the disease commenced by a vesicle filled with clear serum, which enlarged speedily, and the serum became opaque. The borders were slightly red. When I saw the case the bullæ had burst and exposed an irregular ulceration with defined edges slightly inflamed, and with a tolerably healthy surface.

Treatment.—It will be necessary to attempt to improve the general condition of the child, if we hope to cure the local disease. Clean-

* Dub. Med. and Phys. Essays, vol. i. 1808.

liness, comfortable clothing, pure air, and good diet, must be afforded. If there be much fever, of course the diet must be moderate but nourishing, and by degrees broth, beef-tea, or solid animal food, may be given.

The local applications will consist, in the first instance, of caustics—the nitrate of silver, the acid nitrate of mercury, dilute nitric or muriatic acid, &c. so as to change the surface and arrest the ulceration, after which poultices may be applied.

M. Bielt has succeeded with the proto-ioduret and deuto-ioduret of mercury in the form of ointment; a scruple of the former, and from twelve to fifteen grains of the latter, to an ounce of lard.

CHAPTER III.

IMPETIGO. PORRIGO.

I. IMPETIGO.

WE now come to the consideration of pustular eruptions, and the one I shall first notice is one which occasionally assumes a vesicular appearance, although really pustular. *Impetigo*, moist, or *running tetter*, is marked by small psudracious pustules, neither accompanied by fever, nor contagious, nor communicable by inoculation. Dr. Bateman says that it chiefly occurs on the extremities, but it may also attack the head. In children it is very apt to appear in parts where there is much movement, such as the flexures of large joints, and is accompanied with intense itching. It may be excited by dentition, disorder of the stomach and bowels, &c., and is frequent in children of deteriorated constitutions.

When it attacks the scalp it is preceded for a few days by feverish symptoms, and sometimes by vomiting; the scalp is hot and tender, and with a slight redness where the eruption is about to appear. The

pustules are psudracious, occurring singly or in groups, with inflamed bases. Each pustule contains thick, yellow, purulent matter, which is soon matured, and forms a greenish-yellow scab. This form Dr. Neligan considers to assume a chronic form but rarely; fresh pustules appearing in different parts of the scalp as the old ones heal. "The second form of the disease is characterized by the eruption occurring in groups of pustules, but the individual pustules are also different in character, being of the variety which have been termed *achores*. Their appearance is attended with more decided symptoms of inflammation, both general and local, and the heat and itching are in many cases so severe that children tear the scalp, and prevent the disease from presenting the truly pustular character of the first stage. The eruption usually commences on the forehead, involving at the same time some of the hairy scalp. The inflamed patches vary in size and form in different cases; in some extending in their longest measurement not more than from half an inch to one or two inches, while in others the greater part of the scalp is involved from the very commencement. In nearly every instance the skin bordering on the scalp is more or less engaged in the disease, and it often appears at the same time in the ears or on some part of the face. The pustules are not so large as when they occur singly; their coats are apparently thinner, and the pus which they contain is not so consistent, and is of a richer yellow color. They usually become confluent before they burst, and the resulting greenish-yellow (when chronic, greenish-brown) scab is consequently much more extensive. When the eruption has continued for any length of time, large quantities of bright yellow pus are secreted beneath the greenish crusts, which separate in cracks, to give exit to the matter, exhibiting beneath the highly inflamed raw surface of the scalp, from which the pus is secreted."* The disease does not appear to be contagious; it chiefly occurs in infancy and childhood, and may last for years, if neglected. It constitutes the *crusta lactea* of authors. I cannot agree with Dr. Neligan that the hair is unaltered; it is not so rapidly or so completely destroyed as by *porrigo*, but, if the disease be of long standing, the roots of the hair are injured, and its growth checked; it becomes thin and poor-looking.

In this, as in other severe eruptions of the scalp, the glands at the sides and back of the neck, below the hair, are apt to be enlarged and tender, but they rarely suppurate. Small abscesses sometimes form at the nape of the neck, close to the roots of the hair.

I have no doubt that occasionally a brisk eruption on the head may prove a salutary counter-irritation, and hence I suppose has arisen the popular objection to curing them. But I do not conceive that there is any danger if due care be taken, and I am quite sure that many evils follow their long continuance. Sore eyes or ears, otorrhœa, glandular

* Dublin Journal, August, 1848, p. 39.

swellings, &c. may, I believe, often trace their origin to a chronic eruption neglected.

Treatment.—From the amount of inflammation present, our first applications must be of a soothing character. After cutting the hair as short as possible with a pair of scissors, a poultice of bread and milk, or linseed meal, may be applied over the inflamed parts, or they may be frequently fomented with the decoction of poppy-heads. At the same time, if the child can well bear it, a brisk purgative should be given, and the child put upon low diet, or confined to milk, as Dr. Neligan recommends. With children who are in bad health, or whose constitution has been impaired, we must use caution as to purgatives, and it may be desirable to allow a more generous diet.

When the redness is diminished, and the irritation is calmed, we may use a lotion of the sugar of lead, black wash, or the alkaline lotion recently described, with the alkaline ointment.

This treatment, with cleanliness and pure air, will soon effect a change in the aspect of the disease, unless the child be teething, and then, although dentition did not cause the disease, it may be kept up for some time, until the teeth are cut. Even lancing the gums, which should always be done, will not always immediately relieve the irritation.

II. PORRIGO, OR SCALD HEAD.

By Bateman and the older writers, porrigo has been regarded as a pustular disease, the result of inflammation. Comparatively recent researches with the microscope, however, seem to have established the fact of two varieties, at least, being of vegetable origin, and not the result of inflammation. We are indebted to the investigations of Schönlein, Gruby, Bennett, Corrigan, Müller, Lebert, Robin, &c., for the amount of our present knowledge. But it follows, if this view be the true one, that some of the varieties usually included under porrigo must either be made a separate order, or included among the impetiginous eruptions, leaving the porrigo scutulata and porrigo favosa (or perhaps the p. favosa alone) as an order of vegetable productions of the scalp, the result of constitutional causes chiefly, and not of inflammation.

Dr. Bateman describes six varieties: the *porrigo larvalis*, or crusta lactea, the *porrigo purpurans*, the *porrigo decalvans*, the *porrigo lupinosa*, the *porrigo scutulata*, or ringworm of the scalp, and the *porrigo favosa*. They differ in the size of the pustules, and the form of the crusts or scabs. The *porrigo larvalis* “commonly appears first on the forehead and cheeks, in an eruption of numerous minute and whitish *achores*, which are crowded together on a red surface. These pustules soon break, and discharge a viscid fluid which concretes into thin yellowish or greenish scabs. As the pustular patches spread, the discharge is renewed, and continues also from beneath the scabs, increasing

their thickness and extent, until the forehead, cheeks, and even the whole face become enveloped as by a mask (whence the epithet *larvalis*), the eyelids and nose alone remaining exempt from the incrustation. The eruption is liable, however, to considerable variation in its course, the discharge being sometimes profuse, and the surface red and excoeriated, and at other times scarcely perceptible, so that the surface remains covered with a dry and brown scab. When the scab ultimately falls off, and ceases to be renewed, a red, elevated, and tender cuticle, marked with deep lines, and exfoliating, is left behind." Other parts of the body may be attacked, and the irritation occasions loss of sleep, and much distress to young infants. The description I have quoted from Bateman resembles that of impetigo, already given by Dr. Neligan, and it would often be difficult to decide whether the eruption was impetigo or porrigo larvalis, unless we confine the genus porrigo to the porrigo scutulata and favosa. The treatment recommended for impetigo is well suited to the present species.

THE PORRIGO SCUTULATA, OR RINGWORM OF THE SCALP,

Has given rise to great difference of opinion as to whether it is a pustular or vesicular disease, and whether the pustules or vesicles are at all essential to the disease. Willan, Bateman, Bielt, and the older writers, class it among the former; some of the French writers, especially M. Cazenave, among the vesicular. Dr. Neligan considers herpes to be the true ringworm; and Dr. Burgess regards this form as the result of normal irritation of the bulbs of the hair. When such eminent dermatologists differ, I cannot expect to be able to decide. I can scarcely doubt, after the examination I have made, that there is a form of ringworm, the element of which is a vesicle, but this does not prove that a pustular eruption may not assume this character. Dr. Burgess's description differs equally from that given by Bateman and that by Neligan. Dr. Bateman states that "it commences with clusters of small light yellow pustules, which soon break and form those scabs over each patch, which, if neglected, become thick and hard by accumulation. If the scabs are removed, however, the surface of the patches is left red and shining, but studded with slight elevated points or papulæ, on some of which minute globules of pus again appear in a few days. By these repetitions of the eruptions of *achores*, the incrustations become thicker, and the areas of the patches extend, often becoming confluent, if the progress of the disease be unimpeded, so as to affect the whole head. As the patches extend, the hair covering them becomes lighter in its color, and sometimes breaks off short; and as the process of pustulation and scabbing is repeated, the roots of the hair are destroyed, and at length there remains uninjured only a narrow border of the hair round the head." Dr. Burgess, one of the most recent writers on the subject, thus describes the disease: "We have seldom an opportunity of seeing ringworm in the early stage, for the patient, even, is not

aware of its presence for some time after its development, and the first indication is a trifling degree of itching in the parts, which is relieved by the dislodgment of a thin scurf in the act of scratching. It is this circumstance which first directs attention to the disease. If examined now, there will be found neither heat, redness, nor moisture on the morbid surface, but a thin layer of furfuraceous matter, of an oval or circular form surrounding the hair, either singly or in small groups. These circular patches are always few in number and limited in extent; frequently there is only a single diseased spot to be found on the head, which, if observed early, will be found to extend from a small point or nucleus by its periphery, until the spot attains a certain size of limited circumference, when it ceases to extend, and within these limits the disease passes through its various phases. The skin is dry, uneven, and covered with rough eminences, insensible to the eye and to the touch, which give it the appearance of the prickly condition of skin called 'cutis anserina.' These mammillary projections are enlarged diseased hair follicles, propelled by the hair in its growth from beneath the level of the skin; and if we endeavor to pull the hair, it it will not be detached from the root, but break on a level with, or a short distance from, the mouth of the follicle. The hair that grows on the morbid surface, after it has arrived at the condition described, does not attain any length, but breaks spontaneously at a short distance from the skin, leaving an exposed patch of the scalp, which always maintains a circular, dish-like form. The ends of the broken hairs are jagged, discolored, twisted, and not unlike the filaments of flax and tow. If the disease has not been arrested at this stage, the furfuraceous, scaly matter will become agglomerated, and form dry, thick, dirty, yellow-looking scabs or incrustations, thicker at their circumference than towards the centre. It is the irritation produced by these scabs, but more particularly by the action of the nails in scratching or trying to dislodge them, that produces the pustules, and subsequently the discharge of the contents around the original disease, which deceived Willan, and induced him to place ringworm amongst the pustular eruptions of the scalp. He mistook an incidental or super-induced lesion for the element of the disease, which is totally different."* Whether Dr. Burgess is right in considering these pustules as accidental, produced by the cause he mentions, may be doubted, I think; nor is this inconsistent with his view of the nature of the disease, which he regards as "the result of vitiated or abnormal nutrition in the organs which secrete the hair, analogous to scrofulous degenerations which occur in other structures of the body. The seat of the disease is not in the hair but in the organs which secrete it; and the vegetable productions so minutely described by Gruby, of the existence of

* Eruptions of the Head, Face, and Hands, p. 177.

which there can be no doubt, is a secondary product, and not the disease itself."

Let us now see what has been observed of this "vegetable parasite." M. Gruby remarks: "On examining attentively with the microscope this grayish-white powder which is seen on the morbid surface, you will be surprised to find that it is composed of a number of cryptogamia. On submitting the hairs which grow on this surface to the same method of examination, we shall observe a great quantity of these cryptogames embracing the cylinder of the hair on all sides, and forming round it a perfect vegetable sheath, which accompanies the hair for a short distance after its exit from the follicles. The structure of the hair becomes less transparent; the fibrous portion is interspersed with extremely minute granular molecules, which separate the fibres from each other in part or wholly, the size of which is estimated at the five-thousandth part of an inch in diameter, and the shaft of the hair is distinctly enlarged or hypertrophied. The cryptogame surrounding the hairs at their bases, by contact with the adjoining hairs, involves them in the same morbid condition, altering the texture gradually, until they break off short, and thus expose a circular patch of partial baldness. These vegetable parasites are produced with surprising rapidity. On issuing from the follicle, the hairs become grayish for a certain distance, and in eight days break at the line where the cryptogame surrounds them. The hairs which are most enlarged resist for a long period, and, according as they rise above the level of the skin, are attacked by the parasitic fungus. They are often surrounded at their base by a quantity of cryptogamia sufficient to form a small, grayish elevation. It is these accumulations which have been mistaken for pustules, vesicles, and the secretion of the sebaceous follicles." According to M. Robin,* the seat of this vegetable (*trichophyton tonsurans*) is in the interior of the roots of the hair, and he has described another (*microsperon audouini*) which is seated round the roots of the hair like a cylinder. In the midst of such varying opinions, all that seems agreed upon as to the disease is, the presence of circular or oval spots of, at first, a furfuraceous secretion, upon which ultimately something like pustules, at least, appears; that the hair is at first injured and then falls; that in all probability the disease involves the follicle; and that the secretion is of the nature of a vegetable parasite.

The disease is also highly contagious, and, according to Gruby, it is transmitted by means of the furfuraceous powder, or cryptogame. Approximation of the head, or wearing the same cap, hat, or bonnet, will communicate the disease to another person hitherto free. I have seen spots of ringworm produced on different exposed parts of the body

* Des Vegetaux qui croissent sur l'Homme, &c.

of a person employed in dressing the head of a child in whom this scurf was very profuse, which so far confirms M. Gruby's opinion.

This affection is sufficiently common in children from three years old, and often proves very obstinate, lasting several years. Those of a feeble and flabby habit, the ill-fed, ill-clothed, and uncleanly, who live in unwholesome habitations, are the most exposed to it; but it may be communicated to those in health and of good constitutions.

Treatment.—So long as the spots exhibit much redness, our applications must be adapted to soothe; poultices, emollient fomentations, &c. will be most suitable. The hair must be clipped as short as possible, which is much better than shaving, though more tedious, and requiring more frequent repetition.

When the inflammation is subdued, or the disease has become chronic, we may proceed with more direct attempts to act upon the diseased portion. In the more irritative states, the milder ointments, such as those prepared with the cocculus Indicus, with the submuriate of mercury, the oxide of zinc, the superacetate of lead, or with opium or tobacco, should be employed; or sedative lotions, such as decoctions or infusions of poppy-heads, or of tobacco may be substituted. When there is an acrimonious discharge, the zinc and saturnine lotions, with the milder mercurial ones, such as the ung. hyd. præcip., albi, or the ointment of calomel, or a lotion of lime-water with calomel, are advantageous. According to the different degrees of inertness which ensue, various well-known stimulants must be resorted to, and may be diluted or strengthened, or combined, according to the circumstances. The mercurial ointments, as the ung. hyd. præcip., ung. hyd. nitricoxydi, and especially of the hyd. nitrat., are often effectual remedies; and those prepared with sulphur, tar, hellebore, and turpentine, the ung. elemi, &c., separately or in combination, occasionally succeed, as well as preparations of mustard, black pepper, capsicum, galls, rue, and other acrid vegetable substances. Lotions containing the sulphates of zinc and copper, or the oxymuriate of mercury in solution, are likewise occasionally beneficial.*

M. Bielt was in the habit of using the sulphuret of potash, the iodide of sulphur, or solutions of the sulphate of copper, zinc, nitrate of silver, corrosive sublimate, &c., with success. M. Cazenave recommends an ointment of one part of pitch to two of citrine ointment, and another with a scruple of tannin to an ounce of lard as the most effectual ointments in this disease. Dr. Burgess speaks highly of a "lotion of the bicianuret of mercury, in the proportion of one or two grains to the ounce, according to the amount of stimulus required, which will be found more serviceable than these, or even the solution of the bichloride of mercury, so commonly used in this eruption and in favus." If the latter be used, lint soaked in it should be applied to the parts, and

* Bateman on Cutaneous Diseases, p. 172.

covered with thin gutta-percha or oil-skin; but the former is to be laid on with a camel's hair pencil. "The local remedy, however, which I have found most effectual in the treatment of this obstinate complaint is the vapor of iodine and sulphur, conveyed directly to the morbid patch through a caoutchouc tube, from any simple apparatus for igniting the compound, the patient lying in the horizontal position during the application of the vapor. It will stimulate the parts greatly if applied for twenty minutes, and the diseased surface, which was previously dry and pale, will appear slightly red and bedewed with moisture. The following formula will be strong enough to commence with, which may be afterwards increased according to circumstances :

R.—Sulphur ʒiij.

Iodini, gr. xij to gr. xxiv.

To be divided into six powders—one to be applied three times a day."*

M. Bazin first removes the hair by an ointment of lime and carbonate of soda, of each one part, lard thirty parts; and then a solution of bichloride of mercury (1 part to 250 of water), or an ointment of the acetate of copper. Dr. Parker has recommended a solution of pernitrate of mercury (1 part to 30 or 40 of water) or an ointment of sulphate of copper (1 part), alum (3 parts), and lard (20 or 30 parts).† Dr. Jenner has successfully employed sulphurous acid.‡

The local applications I have found most useful, after the redness had subsided, are the black wash, diluted citrine ointment, ointment of the acetate of lead or oxide of zinc, or hydriodate of potass, and when chronic and obstinate, nitrate of silver or tincture of iodine—the latter particularly. The patches should be painted with it every second or third day.

But local treatment will not be sufficient; we must carefully remove any irritation, such as that from dentition or disordered bowels, and regulate the state of the stomach and bowels; after which in badly nourished, lymphatic, or scrofulous children we must endeavour to raise the tone of the system by good diet and tonics, either mineral or vegetable, or the mineral acids. Dr. Burgess recommends the citrate of iron in infusion of quassia, or a bitter infusion with the hydriodate of potass.

Much time is generally required, and great care before this obstinate disease is cured, and if the treatment be suspended too soon, before the surface of the patches is smooth, pale, and free from scurf, a relapse is almost sure to take place. I think that when the disease has been so far subdued that nothing marks its having existed but the bald spots and a slight excess of furfuraceous scales, I have derived much

* Eruptions of the Head, Face, and Hands, p. 182.

† Brit. and For. Med. Rev., Oct. 1853, p. 418.

‡ Med. Times and Gazette, Aug. 1853.

benefit from a weak ointment of hydriodate of potass; and at this stage ointments seem more useful than lotions.

The hair must be kept quite short until some time after the disease is cured, and when there is no longer danger of much irritation, it may be well to have the entire head shaved once or twice; it strengthens the growth of the hair on the bald spots, and secures an even length over the head. When it is allowed to grow, a little very thin oil of almonds may be used occasionally; the common hair-oils are far too thick, and only neutralize all efforts at cleanliness. The head should be washed occasionally, but nothing can be more injurious both to the tender scalp and hair than the liberal use of soap. By far the best substitute is a portion of the yolk of an egg; if it be well washed off with fresh water, it leaves the scalp perfectly clean and pale, and the hair soft and silky.

PORRIGO FAVOSA.

Notwithstanding the opinions of Willan, Bateman, Alibert, Bielt, and others, of the pustular character of *porrigo favosa*, it seems clearly established now that this variety at least is of a vegetable nature. It is true that Dr. Mahon considers it a morbid secretion of the sebaceous glands, and Drs. Bennett and Burgess and Mr. Erichsen as a tubercular disease; but the researches of Schönlein, Gruby, Remak, Corrigan, Robin, &c., seem to have pretty well set the question at rest.

The confusion as to the nature of the disease may have partly arisen, as Dr. Corrigan suggests, from the presence of two species of eruption on the scalp at the same time. He considers the disease as essentially pustular, but that the growth upon the skin is a vegetable parasite, and he describes the growth from the beginning. If the scalp be shaved and the scabs removed, we may soon observe the whole process of reproduction. "Within some days, a few, often not more than three or four, very minute pustules will show themselves, scattered far asunder over the red surface; they are not raised above the surface, and they seem like dots of transparent amber-colored matter bedded in the skin. In twenty-four hours after, they become solid, depressed in the centre, and of a pale yellow color, very often with a hair in the centre of each. They then rapidly increase in number and size."* These crusts constitute the vegetable parasite, underneath which the skin is red but unbroken, and not secreting matter. Dr. Corrigan has established the fact that the appearance of the matter under the microscope is distinctive of this variety.

In the first stage, it neither gives rise to heat of the scalp nor itching; it commences generally at the edge of the scalp, and from thence

* Dublin Hosp. Gazette, Aug. 15, 1846, p. 2.

spreads rapidly over the head, very often occupying nearly the entire surface of the scalp. The eruption is occasionally, but more rarely, seen on different parts of the body. "The appearance of this eruption is so peculiar and so distinct from all the other eruptive diseases of the scalp that it cannot possibly be mistaken for any of them. It first appears in the form of small, yellow, dry spots, about the size of a pin's head, of a bright yellow color, seated on the surface of the skin, which is depressed slightly by them; each spot is distinct, hemispherical, slightly concave or cup-shaped on its free surface, and convex beneath, where it is adherent to the skin. On removing the small diseased mass, that portion of the scalp on which it was seated is found to be somewhat depressed, smooth, and shining. A single crust of the disease, or *favus*, as it has been termed from its honeycomb appearance, is often traversed by one or sometimes by two hairs, which appear to grow as it were from its very centre or most depressed portion. This has given rise to the notion that the disease is one of the bulbs of the hair; but the fact of its appearance on other parts of the body which are quite free from hair is a sufficient refutation of this opinion. The eruption spreads by additions to the outer edge or circumference of each crust, which thus retains its hemispherical character, until it attains a diameter of two or three lines, or sometimes more. In a case which I have had recently under my care in hospital, some of the favi which were seated on the back of the trunk were fully half an inch in diameter; on the head, however, they rarely exceed the size above mentioned. The adjacent favi, as they increase, unite with each other, and form large irregularly shaped masses, in which the original circular form of the individual crust is lost; the centre also of each is changed in appearance, and, instead of the cup-shaped depression, the entire surface is covered with alternate elevations and depressions, or, so to speak, ridges and furrows, concentrically arranged. The eruption thus increasing, the whole of the scalp—often, too, the forehead, neck, and parts of the trunk—become encased in one large yellow crust, at the edges of which some favi, of the peculiar characteristic appearance, are invariably to be seen. The crusts of porrigo are of a pale sulphur-yellow color; they are hard and dry, and break with short fracture, exhibiting within a mealy powder, of a paler yellow than the external surface. They may generally be removed with facility from the scalp; but they bring away with them a thin layer of epidermis, which is firmly adherent to their under surface, through which small projections may be seen with a moderate lens, sometimes with the naked eye. These projections or processes pass into the dermis beneath, and when the crusts are torn forcibly away, blood issues through the small orifices into which they were inserted. From the very commencement of the eruption of porrigo the hair becomes altered; much of it falls out, and the straggling hairs that remain are thin, broken, weak, whitish and readily removable with the crusts of the disease, in which they are firmly imbedded. When this affection has continued for any

length of time, bald patches are left after cure, on which the hair does not again grow; and even when it has been cured at an earlier stage, the hair never regains its proper character, being weak, thin, and of a pale, whitish-yellow color. As the disease advances, much irritation of the scalp is produced; small pustules form here and there in spots as yet unaffected with the eruption; the tingling and heat are so unbearable as to compel the patient to tear the surface with his nails, even to such a degree as to cause ulceration; innumerable pediculi are engendered; the favous crusts emit an abominable odour, resembling that of urine; and a copious offensive discharge is secreted by the pustules and ulcerated spots—in short, an individual affected with this disease in its aggravated form becomes a loathsome and disgusting object.”* In some parts of the inflamed surface, ulceration occurs, spreading irregularly, and becoming very troublesome. The great irritation of the scalp is extended along the lymphatics, and the glands around the neck become enlarged and tender; they sometimes, but rarely, suppurate. M. Bielt observes that it is rare that any internal organ becomes inflamed.

With regard to the character and appearance of this vegetable favus, Dr. Neligan gives the following extract from M. Robin: “Reduced to powder and placed under the microscope, it presents a mixture, 1, Of tortuous, branching tubes, without partitions, empty, or containing a few molecular granules (*mycelium*); 2, Straight or crooked, but not tortuous tubes, sometimes, but rarely, branched, containing granules, or small rounded cellules, or elongated cellules, placed end to end, so as to represent partitioned tubes, with or without jointed articulations (*receptacles* or *sporangia* in various states of development?); 3, Finally, sporules, free or united into bead-like strings. The mycelium is very abundant near the inner surface of the external layer, to which it adheres. The spongy friable mass of the centre of each favus is principally formed of the sporules and the different tubes containing mycelium already described (*sporangia* or *receptacles*?). We often find mixed with them mycelium tubes, but in small quantity. All these elements pass insensibly into each other; empty tubes (*mycelium*); tubes containing small round corpuscles; tubes with corpuscles as large as the smaller sporules; sporules placed end to end so as to resemble a hollow partitioned cylinder, with a tendency to separate at the joints; and free sporules. Bennett has given a good drawing of this arrangement.”†

That porrigo favosa is a contagious disease, we have proof in the experience of ages; and that it can be propagated by inoculation has been shown by Remak and Bennett, although Gruby and others failed.

* Neligan, Dublin Journal, August, 1848, p. 52.

† Des Vegetaux qui croissent sur l'Homme et sur les Animaux vivans, 1847, p. 8.

They failed, as Neligan observes, because, in addition to the mycelia by which it is propagated, they wanted the proper soil, *i. e.* the state of constitution produced by filth, close air, bad feeding, and insufficient clothing.

It is a very rare disease in Ireland, and almost never met with in persons of a respectable station. "Can it be," Dr. Corrigan asks, "that, like the cow-pox, it is a disease propagated from some inferior animal, perhaps the mouse, on which Dr. Bennett has discovered the same parasitic gland as in porrigo? while the disease in the human subject, as if to strengthen the supposition, gives out so strongly the odour of the mouse, that it forms a well marked diagnostic sign of the disease? and that to favor its production, poverty or sickness must have reduced the living body to a state fit to constitute a nidus for a parasitic plant; as in parasitic growths, the more feeble or more sickly the animal is, the more will such growths develope themselves."

Treatment.—Our first object is the removal of the crusts and the diminution of the inflammation, and this will be best attained by the application of poultices for twenty-four hours, which should be changed as often as they become dry. The hair should be cut as close as possible previously, but not shaved at this period.

Dr. Bateman recommends the application of the ung. zinci, or the ung. hydr. præcip. albi, mixed with the former, or with a saturnine ointment, or "the ointment of the nitrate of mercury, diluted with about equal parts of simple cerate, and of the ceratum plumbi superacetatis," varying the proportions of the ung. ceræ according to the degree of inflammation.

M. Biett speaks most favorably of alkaline or sulphurous applications, or acid lotions. The subcarbonate of soda or potash, in form of ointment at first, and afterwards more diluted as a lotion; or the following lotion, which is much used at St. Louis:—

R.—Potass. sulphuret. ʒij.

Sapon. alb. ʒijss.

Alcohol. rect. ʒj.

Aquæ calcis, ʒvij.—M.

Muriatic or nitric acid much diluted, sulphurous douches; or, if more powerful applications are needful, solutions of sulphate of zinc or copper, nitrate of silver, or corrosive sublimate, may be tried.

M. Biett has also found benefit from the use of the iodide of sulphur, applied by gentle friction in the form of an ointment, containing from a scruple to half a drachm, to an ounce of lard.*

Dr. Corrigan speaks highly of the oxymuriate of mercury, which he employed because of its power of destroying the sporules of crypto-

* Cazenave and Schedel, *Mal. de la Peau*, p. 244.

gamic plants. "I have used it," he says, "in the form of ointment, in the proportion of five grains in very fine powder, to an ounce of ung. cetacei. I have used it in the proportion of ten grains to the ounce, but it sometimes gives pain in this large proportion. A small portion of the ointment is rubbed in on the part affected every day. It has not salivated in any instance in which I have employed it; its action in the first of these cases was peculiarly satisfactory," &c.

M. Mahon has a depilatory which removes the hairs very completely. M. Chevalier believes it to be chiefly composed of lime and carbonate of potash. The carbonate of potash, the lotion recommended by Bielt and Neligan, of which I have already spoken, will answer this purpose very well.

Dr. Neligan's method is as follows: "As soon as the poultice is removed, the head is well washed with the stronger carbonate of potash lotion, and slightly brushed with a soft hair-brush, or a roll of lint; the scalp is then covered with the carbonate of potash ointment, spread on lint, and over it a closely fitting oil-silk cap is placed; the ointment is renewed twice daily. By the use of these applications the crusts of the eruption are generally completely removed in from two to three days. The carbonate of potash ointment is at the expiration of this time replaced by one containing the iodide of lead, in the proportion of half a drachm of the iodide to an ounce of prepared lard; the head is to be still washed every morning with the carbonate of potash lotion. In some cases it will be found that the iodide of lead ointment excites a certain degree of inflammation of the surface of the scalp after it has been used for some days; when such occurs, it should not be applied for a day or two, and the lotion alone employed three or four times daily. After this first attack of inflammation disappears, I have not seen it again recur, although the use of the ointment had been persisted in for months. The strength of this ointment should be increased after a fortnight, if the disease again appear, even to double that above indicated." After this treatment or any other has been continued for some time, it should be suspended for a time, to see if the disease will recur, or if it be really cured. If it reappear we must again have recourse to the external applications, as well as to the internal remedies.

Professor Hebra, of Vienna, directs his attention first to the destruction of the plant, and then to the prevention of its reproduction: "With this view he orders the hair to be cut close, and, after the favous crusts are softened by a sufficient quantity of oil, the head should be enveloped in warm fomentations, composed of a melange of soap and bran, which are to be continued until the incrustations covering the scalp begin to swell, and detach themselves from their bases. After removing these softened crusts with a spatula, the brush and comb should be used, and the scalp examined carefully (which will be found very red, bleeding easily, and the seat of several excoriations), so as to ascertain if there is still any favous matter remaining; for it is necessary to remove the seeds of the disease from the epidermic cells

and hair follicles, in order to prevent their reproduction. To attain both these objects, M. Hebra strongly recommends lotions of the deutochloruret of mercury, of the nitrate of silver, or of arsenic, and the ointment of the iodide of lead, as very efficacious remedies. He also sometimes employs ointments of the *coccus indicus*, of quick lime, of the carbonate of potash, the citrine ointment, and the dilute mineral acids. He has then succeeded more rapidly in completing the cure by the following method than by any other: the favous matter being removed from the scalp, the dilute acetic acid should be rubbed over the morbid parts until they bleed slightly; when this occurs, the acid is to be omitted, and an alcoholic solution of iodine applied in its stead and continued for several weeks, until the parasite ceases to be produced."*

Dr. Burgess speaks favorably of alkaline lotions and iodide of sulphur, as recommended by M. Bielt, but he prefers the vapor of iodine and sulphur to all other remedies. I have found the nitrate of silver and caustic tincture of iodine very useful after the removal of the crusts and hairs.

But external applications alone will not be sufficient. In almost all cases the disease is a constitutional one, and must be met by constitutional remedies. After due care in the removal of all irritation from teething, or gastro-intestinal disturbance, and a careful regulation of the stomach and bowels, we must afford the child the relief of cleanliness, pure air, and a most invigorating diet, at the same time avoiding crude vegetables and fruits, and all stimulating substances. Milk puddings, broths, and plain animal food, may be given, according to circumstances. Dr. Neligan confines the patient entirely to a milk diet. The medicines recommended by Bateman are alterative doses of mercurials, "especially when the biliary secretions are defective, the abdomen tumid, or the mesenteric glands enlarged." Small doses of calomel, either alone or with soda, and some testaceous powder, or, if the bowels are irritable, the *hyd. c. cretâ*. If the patient be of a squalid habit, or the glandular affections severe, bark and chalybeates, or the muriate of barytes combined with the former, will be of service.

Dr. Neligan speaks most highly of the iodide of arsenic, which he says may be safely given to the youngest child, "its effects being, of course, duly watched." "The dose of this preparation is, for an adult, from one-tenth to one-fourth of a grain, very gradually increased; for a child six years old, one-fifteenth of a grain; and for a younger child, from one-eighteenth to one-twentieth of a grain. It is best given to adults in the form of a pill, made with dry manna and a little mucilage; to a child it is best administered in the form of powder, its minute division being perfected by means of a little white sugar or aromatic powder. When the system is saturated with this medicine,

* Burgess on Eruptions of the Face, Head and Hands, p. 195.

we usually find that some constitutional symptoms, such as acute headache, dryness of the throat, &c., are manifested ; but, in some cases, I have given it in full doses for many weeks without any manifestation of its effects further than those produced on the disease for which it was administered. When, however, it gives rise to the symptoms above mentioned, its use should be intermitted for some days, and an active purgative administered."

When the condition of the child is deteriorated and the nutrition feeble, much benefit is derived from the use of the cod-liver oil. It will not only aid in the cure, but may prevent the evil consequences of a long-continued eruption of whatever nature. Dr. Hess has occasionally found it act with remarkable benefit.

SECTION VI.

ERUPTIVE FEVERS.

CHAPTER I.

MEASLES. RUBEOLA. MORBILLI.

MEASLES consists essentially in an exanthematous eruption of the skin and mucous membranes, of a circular or crescentic form on the skin, preceded and accompanied by fever, running a defined course, occurring epidemically or propagated by infection, and generally attacking a person but once during a lifetime. It is much more common among infants and children than among adults, and among the latter than with old people; and, without going so deep as some writers have done, the explanation seems to me natural and easy. The disease is by no means uncommon; it is often epidemic, and always contagious or infectious; and of course a child takes it the first time it is exposed to its influence, which must happen before it is many years or perhaps many months old. The reason that fewer adults than children take it is simply that the majority of adults had it when children.

Some dispute has arisen as to the antiquity of measles, some authors contending that they were known to the ancients; but Gruner* and Sprengel have shown that they appeared about the same time as smallpox. The earliest account we possess is by Rhazes; Avicenna has also described this disease, and distinguished it from smallpox, with which it has been often confounded even in comparatively modern times. The distinction was first clearly made by Forestius (1597), Schenck (1600), Riverius (1655), and especially by Sydenham (1676), and

* Var. Antiq. ab. Arab. solum repetend., sects. 7, 14, 17.

Hoffmann (1718). It has been confounded with scarlatina so recently as in the writings of Morton and Watson; indeed, as Dr. George Burrowes has remarked, the distinction between the two diseases was not thoroughly established until Dr. Withering's Essay on Scarlet Fever in 1793 and Dr. Willan's Treatise on Cutaneous Diseases, were published.

Some notion of the frequency and fatality of measles may be gathered from the fact stated by Dr. Gregory, that, on an average of five years, nearly 6 per cent. of the mortality of London is due to measles and scarlatina. According to the Fifth Report of the Registrar General, 81 per cent. of this mortality occurs in children under five years old, and 97 per cent. in children under ten years old. In his admirable Report upon the Table of Deaths, appended to the Census of Ireland taken in 1841, Mr. Wilde states that in the ten years preceding, the deaths from measles amount to 30,739, in the proportion of 100 males to 96.12 females. "Compared with all diseases; the deaths from this cause amount to 1 in 38.62, and with all the epidemic affections to 1 in 12.4, being the sixth most fatal disease of this class. With the exception of the year 1840, when 4,491 deaths from this cause are returned, measles have presented the most remarkable uniformity throughout the entire period. The age at which the disease has proved most fatal was from birth to the end of the first year, when the sexes were 100 males to 86.74 females; from the first to the end of the fourth year, 100 to 100.04; from the fourth to the fifteenth, as 100 to 100.57; from the fifteenth to the thirtieth, 100 to 138.76; and after 30, as 100 to 161.81."* Now, as we know that a large proportion of those attacked by the disease recover, we may infer, from these tables of mortality, the very great frequency of measles.

Symptoms.—After exposure to the epidemic influence or to contagion, an interval elapses before the child exhibits any symptoms of the disease. This period of incubation, as it has been termed, may vary from a few days to two or three weeks. In the majority of the cases inoculated by Dr. Home, the fever showed itself in about the seventh day. M. Bouchut, in an epidemic in the Hôpital Necker, found this period range from twelve to thirty days after exposure.† Dr. Panure, who had opportunities for unusually accurate observations, found the period from exposure to contagion to the appearance of the eruption to be either thirteen or fourteen days.‡ As a general rule it will, I think, be found that the fever commences from the fifth to the eighth day.

The course of the disease, after the fever has set in, may be divided

* Report upon the Tables of Deaths, &c., p. 13.

† Mal. des Enfants Nouveaux-nés, p. 487.

‡ Mode of propagation of Measles, by Dr. Panure, of Copenhagen, Edinb. Monthly Journal of Medicine, June, 1851, p. 589.

into the period of invasion, of eruption, and of decline, and each of these may be successively described.

1. *Period of Invasion.*—The earliest symptom is a sense of weariness, and a chilliness increasing to rigor, and followed by febrile heat of skin and quick pulse, increasing in intensity for some hours. Or the child may at once awake in the midst of high fever, with dry skin, flushed face, a very quick pulse, thirst, &c., in which there is occasionally some little remission at the appearance of the eruption. The face soon becomes flushed, the eyes injected, suffused, sensitive to light, and with incessant lachrymation; the eyelids are swollen, and the child is constantly rubbing them and the nose, in consequence of the incessant itching and tingling. The nasal mucous membrane is red, congested, and so irritable, that the contact of air occasions perpetual sneezing. Sometimes epistaxis occurs, and there is always more or less of a thin, acrid secretion at first, which afterwards become thicker, and finally muco-puriform.

The bronchial mucous membrane is equally affected; from the beginning there is a hoarse, rough cough, dry and laryngeal, and which comes on in kinks. It is certainly very characteristic, but I doubt whether we could decide upon the nature of the attack by this symptom alone. Heberden and Peter Frank met with cases in which the cough did not appear till after the eruption. These symptoms do not come on gradually, but commonly appear at the very outset of the disease all together. Other symptoms occur during this period, but without any regular order. M. Heim has noticed a peculiar smell, which he compares to recent goose-quills, and which lasts five or six days; Home compares it to that of small-pox; and Heyfelder thinks that it is stronger in the morning than in the evening, and when many patients are together. I have certainly noticed a peculiar heavy smell, which appeared to be owing to increased cutaneous secretion, but I have not noticed its increase in the morning. On the other hand, Guersent, Condie, Rilliet and Barthez have not perceived it. MM. Blache and Guersent mention that they have frequently observed a punctuated rose color of the vault of the palate to precede the eruption of measles, quite distinct from the redness observed in scarlatina, as had been previously remarked by Heim and Marc d'Espine.*

Nausea and vomiting occasionally occur during this period; but in general, the gastro-intestinal mucous membrane is less affected than the pulmonary. The lymphatic glands of the neck, and along the margin of the eyelids, are not unfrequently enlarged. The urine is generally scanty, of a deep red color, very acid, and of increased density. The urea, chlorides, and sulphates, are frequently increased, with a small proportion of albumen.

The symptoms I have enumerated are generally present, but they

* Diet. de Méd., vol. xxvii. p. 338.

may be differently grouped, sometimes the nervous symptoms predominate, and we may have delirium, stupor, or convulsions; in other cases, the pulmonary or gastro-intestinal may be more marked, as will be shown by great dyspnoea, and frequent cough; or by vomiting and purging. Moreover, if the attack of the measles occur in the course of another disease, these precursory symptoms will generally be much less marked. They occupy ordinarily from two to four days; seventy-two hours according to Dr. Gregory; but, in some cases, Blache and Guersent have known them prolonged for seven, eleven, or even fifteen days. Rilliet and Barthez have given the result of their observations in forty cases of normal measles: in one case there were no precursory symptoms; in one, they lasted a few hours; in eight, one day; in eleven, two days; in seven, three days; in eight, four days; in two, five days; and in two, seven days. Dr. Panure observed the catarrhal symptoms in the majority of cases from two to four days before the eruption, but in some they occurred four or six days, and in others six or eight days previously.

2. *Period of Eruption.*—About the third or fourth day we may observe a few distinct, elevated, red papulæ on the face or forehead, resembling flea-bites in size and color, very like those at the commencement of variola or in typhus fever, but speedily acquiring a very different appearance. These rapidly increase in number, more profusely on the face, but spreading to the chest, body, and extremities, very quickly. As the number increases, they coalesce, and, in so doing, present their characteristic appearance of irregular semicircles, of a red color, or crescents, with clear skin in the centre, or now and then a single spot. This appearance, which was first pointed out by Dr Willan, is quite peculiar to measles, and at once distinguishes it from scarlatina. The surface of the eruption is perceptibly elevated above the surrounding skin, especially on the face, which is altogether swollen and puffy, and less so on the body and limbs. "In many persons," as Dr. Willan has remarked, "miliary vesicles appear, during the height of the efflorescence, on the neck, breast, and arms; and papulæ often occur on the wrists, arms, and fingers."

On the second or third day of the eruption (the sixth of the disease) the rash is at its height, after which it begins to subside; at first on the face, where it first appeared; then on the body and limbs; so that, on the ninth day, little more than slight discolorations of the skin can be detected, and even these disappear by the end of the tenth day from the invasion of the disease. Until the eruption begins to decline, it is accompanied by intense itching occasionally. I have known children kept awake all night by it, and so excited that I feared every moment an attack of convulsions. In other cases, the itching is more troublesome during the period of desquamation.

Unlike some other eruptive fevers, the general symptoms do not appear to be relieved when the eruption makes its appearance: in some cases the pulse may be a little quieter, but in general it is as quick as

ever, and the fever as high or higher; the skin is intensely hot, but moist; the tongue loaded with white or yellow fur, interspersed with the enlarged red papillæ; the vault of the palate and the pharynx are red, and feel dry and rough; the thirst is great, and the appetite entirely lost, until the disease declines; and on the gums around the edges of the alveoli, a soft white pellicle is often deposited, which can easily be raised with the finger-nail. The catarrh of the mucous membranes continues, the eyes are suffused and weeping, the mucus secreted by the conjunctivæ is more abundant and thicker, and drying during the night, the eyelids are temporarily glued together; the secretion from the nasal mucous membrane is of thicker consistence, but not less copious; the cough continues, but is a little softer; the voice is still rough and hoarse; there is no diminution in the dyspnoea or the bronchitic râles heard in the chest. The face is as much swollen as ever, and remains of an intense red color until desquamation commences.

The duration of this period varies from three to six or eight days, or even longer. M. Reveillé-Parise mentions a case in which the eruption was vivid as ever on the tenth day.* The disappearance is gradual, and follows the same order as their appearance; they become fainter in color and flatter; the slight red areola around the papulæ disappear, and the whole acquires a yellowish tinge. In those parts where the eruption was most intense, certain yellowish spots, stigmata or maculæ, remain, and which have been noticed by MM. Guersent and Blache, Rayer and Trousseau. They are not very apparent when the child is quiet, but when excited they assume a deeper color; they seem to be seated in the cutis, and do not disappear under pressure; but whether they are a kind of ecchymosis M. Trousseau will not venture to say. They appear connected with a severe form of measles.† The general symptoms, and the irritated condition of the mucous membranes, simultaneously and gradually diminish.

3. *Period of Desquamation*.—About the seventh or eighth day, the desquamation of the cutis commences. In some cases this process is scarcely marked at all; in others, it is confined to the face and chest, where the eruption has been most severe. Unlike desquamation in scarlatina, in measles we find very small furfuraceous lamellæ, which appear like fine whitish dust, or in some cases only a cracking of the cuticle. The process, when perceptible, lasts for three or four days, during which time an equal progress has been made towards health in the general symptoms. The pulse has become quiet, the skin cool, the tongue cleaner, the thirst less; some little wish is expressed for food; the voice recovers its natural tone; the cough is softer, and the expectation free. It not unfrequently happens that at this time diarrhoea

* Gazette Medicale, 1835, vol. iii. p. 360.

† Bouchut, Mal. de l'Enfance, p. 294.

sets in, and presents all the aspect of a crisis, in which light it is regarded by many authorities. After this period, if nothing intervene, the progress of the patient to perfect health is rapid and complete.

Thus far I have described only a simple, uncomplicated case of measles, which we have seen is marked by preliminary fever and coincident irritation of the mucous membranes; by a semicircular or crescentic eruption of red papulæ, with a continuance of the fever and irritation; and by the final desquamation of the cuticle, with subsidence of the fever, local irritations, and general symptoms: the entire process occupying from ten days to a fortnight. Such cases are most favorable, and we may say always recover; but we have also seen that measles is a very fatal disease in children, and it is now our duty to inquire into the causes of this fatality, and it will, in almost all cases, be found to depend upon some modification of the disease, or upon a defective constitution in the child, or upon some complication.

Let us then consider—

1. *The Modifications of Measles.*—1. The eruption may vary as to extent; in some it is abundant and universal; in others it is limited, and consists of but few distinct papulæ or rings.

2. The color may differ much in different cases; ordinarily it is of a vivid or deep red; in other cases, pale and dirty-looking in sickly children; or it may assume a dark livid color, the *rubeola nigra* of Willan.

3. The eruption may vary in its seat; it may commence and continue most marked, as in a case I lately saw, upon the hands, shoulders, or back, or upon the cicatrix of a blister. In the morbillous fever of Sydeudam (1674), it was principally on the neck and shoulders; in an epidemic at the College de Vendôme, in 1826, M. Gendrin observed it was confined to the face. In a case mentioned in Rust's Journal, the eruption occupied one-half of the body only.*

4. The eruption is sometimes much more distinct and prominent; and this form has been called by the French "*rougeole boutonneuse*:" these papulæ become flattened about the third or fourth day.

5. In some rare cases the spots resemble pupura, being really ecchymoses underneath the cuticle, just as blood may be at the same time effused into other organs. The spots are blood-red at first, but gradually become yellow as absorption goes on. In other instances they are brown, or nearly black: according to Rayer, this hemorrhagic measles differs from that variety called by Willan "*rubeola nigra*."

None of these variations involve either inconvenience or danger in themselves; the latter may indicate a source of danger in some weakness or deteriorated condition of the constitution, and may serve to put

* Bull. de Ferrussac, 1829, vol. xxvi. p. 286.

us on our guard against the occurrence of hemorrhage in more important organs.

6. Again, the course of the disease may be anomalous; the eruption may disappear too soon and altogether, or it may return in a day or two, accompanied with an increase of fever, and the development of symptoms indicating internal disease. Dr. Willan first noticed this circumstance. He records two cases of the kind in his Reports of the Diseases of London. Frank, of Vienna, has observed the same thing. Dr. Conolly recites a like case, where the renewed eruption was so copious and intense on the face as to make it impossible to recognize the features. Some years ago, a case in every respect similar occurred at Brompton to Dr. Seymour and Mr. Chinnoek. Ten days elapsed in this instance before the renewal of the exanthematic action.* The disappearance may be owing to some accidental cause, as cold, irregularities of diet, &c., or may result from internal organic disease. Whenever it occurs, we should never rest until, by repeated and careful examination, we have assured ourselves of the integrity of every organ of the body, or have detected the seat and nature of any internal disease. Such deviations are not unfrequent when measles occur in the course of another disease, or in certain epidemics, or in hospitals for children.

7. Three other anomalies I must notice: The *rubeola sine catarrho* of Dr. Willan, which he observed "in a few rare instances, during an epidemic rubeola, which is only important as it leaves the susceptibility of receiving the febrile measles after its occurrence. The course and appearance of the eruption are the same as in *rubeola vulgaris*, but no catarrh, ophthalmia, or fever accompanies it. An interval of many months, even two years, has been observed between this variety and the subsequent febrile rubeola; but the latter more frequently takes place about three or four days after the non-febrile eruption."† Dr. Gregory says, "that it is a very rare variety, and only interesting in a pathological point of view." Dr. Hosack witnessed it in New York in 1813, and Dr. Dewees mentions that he has had several opportunities of seeing it. It is, I think, extremely doubtful whether such cases are measles at all; they appear to me to belong to the order *roseola*, of which I spoke in the last section; at all events they possess no distinctive characteristics of measles, for the eruption of *roseola* may present the semicircular or crescentic form. Dr. Gregory remarks that if the preliminary fever continue seventy-two hours, the disorder is measles, whether catarrh be present or not; but if the eruption succeed a fever of twenty-four or forty-eight hours, it is not true measles.

8. During an epidemic of measles, it has sometimes happened that

* Dr. Gregory on Eruptive Fevers, p. 104.

† Bateman on Cutaneous Diseases, p. 63.

children have been attacked by fever and catarrhal symptoms so closely resembling those of measles, that the case has been assumed to be measles, although no eruption makes its appearance. Morton mentions such a case of "*morbilious fever*," as it has been termed. De Haen, Morton, Vogel, &c., assert that cases of this kind frequently occur during an epidemic. Dr. Eberle observes: "It certainly is not uncommon during the prevalence of epidemic measles to meet with fever attended with the usual catarrhal symptoms of the malady, but unmarked by its peculiar eruption. Richter observes that persons affected by these fevers are generally exempt from the disease during the subsequent progress of the epidemic."* It would, of course, be difficult to pronounce such to be cases of measles, nor have we any evidence to prove that the attack confers the usual immunity for the future, even though the patient may escape the disease during that epidemic.

9. Many writers mention the occurrence of measles more than once in the same individual, but we must reject all such histories as were written before the distinction between scarlatina and measles was distinctly laid down, and also all reports not authenticated by medical evidence, and then it seems probable that the cases will be much reduced in number. Rosenstein says that in forty years' practice he never met with such a case; and Dr. Willan and others have made similar statements after twenty years' practice. Dr. Baillie has shown, however, that they may recur a second time in the same person, with febrile and catarrhal symptoms.† Dr. Dewees seems doubtful about it, except where the first attack may have been the *rubeola sine catarrho*. Dr. Home mentions a case in which glandular enlargement followed measles, and after this had subsided, in the course of six weeks the patient had measles again. Genovesi attended forty-six cases in Santa Cruz who had the disease before; and Duboscq de la Roberdiere prescribed during the epidemic at Vire, in 1777, for the persons whom he had cured in 1773. Dr. Eberle witnessed but one unequivocal example. Rayer mentions three instances which occurred to himself. MM. Guersent and Blache remark: "We have seen infants with measles twice in the same year. With one little child we observed in the space of six weeks two very irregular eruptions of measles, with varioloid occurring between. In another case the first eruption was mild, but the second, which occurred two months afterwards, was extremely severe; and more recently a young girl of thirteen years, who had been treated by one of us for measles in her infancy, was attacked for the third time. This last eruption was extremely confluent, but she was free from bronchitis, and coryza appeared only on

* Diseases of Children p. 429.

† Trans. of a Society, &c. vol. iii. p. 253.

the decline of the disease.”* Dr. Condie mentions that several such cases have come under his notice. I have, in common with others, seen several cases of measles in persons who were said to have had the disease before, but I confess I never could quite satisfy myself about them. However, a short time ago one of my children was seized with the fever and catarrhal symptoms of the usual duration, followed by the characteristic eruption, upon the hands first and most marked, then upon the face, body and limbs, and which Dr. Stokes agreed with me was certainly measles. Yet I have a record, written at the time, of his having had the disease well marked seven years ago, and of other children having taken it from him. This time it has not been propagated.

Other and much more important variations of measles have been noticed, dependent upon the predominance of some general character, or upon some particular state of the constitution. These may be very numerous if we take each complication as the characteristic, but I prefer leaving the complications for the present, and noticing merely the inflammatory, congestive, and typhoid type of measles. The prevalence of either of these types in any given epidemic, doubtless depends upon what has been called the atmospheric constitution of the time, and, as this will determine the character of the treatment, it is essential that a well informed physician should at all times ascertain this point.

1. We may form a very good idea of measles, with predominance of *inflammatory* character, or inflammatory measles, by supposing the description I have already given to be exaggerated many fold. The fever runs very high; the pulse is rapid, full, and bounding; the skin burning hot, and of a vivid color; the eyes and nose incessantly running; the catarrh severe; frequent cough, dyspnoea, pain, &c. indicating some pulmonary complication; headache, confusion of ideas, perhaps delirium or convulsions. Blood drawn exhibits the buffy coat. The eruption appears early and copiously, is more prominent and more intensely red than usual, and the face is unusually swollen. This variety seems excited chiefly in children of a full, plethoric habit, who have been highly fed, and kept in close or warm rooms, or who suffer much from teething. The complications most common are convulsions, croup, pneumonia, and gastro enteritis.

2. The *congestive* form is remarkable for a deficiency of vital energy. Reaction is tardy and imperfect; there is much depression; the face is pale, the features sunk and anxious; the pulse labored and weak; breathing oppressed, and the extremities cold. The eruption may not appear at all, or partially here and there. Children

* Loco Citato, p. 677.

of a feeble constitution seem most liable to this form. In two cases of the kind related by Dr. Armstrong they died comatose and convulsed, and, upon examination, great engorgement of the lungs was detected.

3. The *typhoid* or malignant form of measles is characterized by the usual symptoms of typhus fever. The pulse is occasionally nearly natural, but more frequently weak and quick; the skin is dry and burning, and petechiæ may be observed in different parts. Colliquative sweats, diarrhœa, and hemorrhages occur, and the entire system is prostrated. Dr. Gregory thus describes this variety: "The eruptive fever is severe, and attended with unusual symptoms. The fever is typhoid, not inflammatory. The eruption appears too early or too late. It perhaps recedes after showing itself, and partially reappears. The stomach is irritable; vomiting is both severe and protracted; there is delirium with wildness of eye, or coma; the belly is tender; there is purging of unhealthy stools; the extremities are cold, the pulse small and wavering. On the surface appear petechiæ or ecchymosed patches of eruption; the fauces assume a livid or dusky red color; blood passes by stool; there is much oppression at the præcordia, and abundant muco-serous discharge from the chest, indicating the congested condition of the lungs and their mucous membrane. In these almost helpless circumstances children may die in forty-eight or sixty hours, asphyxiated by the condition of the air-passages; others die of coma or convulsions; some are worn out more slowly by diarrhœa and bloody stools."* This form prevailed epidemically at Plymouth in 1745, in London in 1763, and in Edinburgh in 1816.

We will now pass on to the

Complications.—1. *Convulsions.*—I have already alluded to this complication as occasionally ushering the disease; it is not very common, but we may now and then observe it in the inflammatory form, in the first period of measles or in the second, as the result, apparently, of reflex irritation. In most cases it appears a simple attack, and consists of a single convulsion; but in others the convulsions are repeated with a train of symptoms intimating an inflammatory affection of the membranes of the brain, and in these we can discover traces of cerebral or meningeal congestion or inflammation after death. In almost all cases, the abstraction of blood by leeches, or counter-irritation of some kind, will be necessary, with free evacuation of the bowels; but, for details, I must refer the reader to the chapter on convulsions.

2. *Inflammation of the pharynx and larynx* is a tolerably frequent complication of measles, as of scarlatina, but the larynx is more commonly the principal affection. The redness of the pharynx is slight, without swelling or ulceration, but the mucous membrane of the larynx

* On Eruptive Fevers, p. 109.

is often red, ulcerated, softened, or covered with false membrane, constituting true croup. In some few cases the croup may be spasmodic. The attack generally occurs about the third or fourth day; sometimes both the larynx and pharynx are affected simultaneously; in other cases successively. Nor does the complication prove so fatal as might have been expected, for, according to Guersent and Blache, a great proportion are cured when the measles are of a mild form; and in many children who are carried off by some complication at a later period of the disease, very severe lesions of the larynx are observed to be in progress of cure. Much, however, will depend upon the constitution of the child and the character of the epidemic; occasionally we find this complication prove very fatal. I have already indicated the treatment of secondary croup.

3. *Broncho-pneumonia*.—The most frequent and most important of these complications is inflammation of the bronchial tubes and lungs; and although these two affections are distinct, yet are they so often combined, that Guersent and Blache consider them together, and with sufficient reason. Thus they met twenty-four cases of bronchitis, seven of pneumonia, and fifty-eight of lobular broncho-pneumonia.

This affection may occur during the preliminary fever, the decline of the eruption, or after the measles is apparently cured. But it is far more frequent during the first period; and it is found to influence the course of the measles, just as its own course is influenced by the primary malady. When it does not occur until the second period, it does not appear to modify the measles; each disease runs its course, but the pneumonia has the character of a secondary disease. When it occurs after the disappearance of the measles, it is a primary disease, affected, doubtless, by the condition of the child, but generally lobar, unless other complications have intervened, in which case it is more frequently lobular. Dr. Gregory has given a very graphic picture of this complication: "It is a slow-creeping, insidious form of inflammation, which too often throws the practitioner off his guard. No positive complaint is made. The child droops and appears exhausted. Imagining that the disorder has weakened his patient, the practitioner directs some mild tonic. Meanwhile pneumonic engorgement (or pneumonia in its first stage) creeps on. The lungs become more and more congested, and at length solidified. Convulsive fits now take place; alarm is taken, and leeches are applied, but the mischief is irreparable. Dyspnoea increases. The child becomes drowsy; the feet cold. The pulse sinks. Florid effusion now takes place from the bronchial membrane. Another and another fit succeeds. Rattles are heard in the throat, and the child dies!" In some cases we find bronchitis alone, or mixed with some nodules of lobular pneumonia, and so severe as to cause death; in other cases the pneumonia exists alone, but more frequently they are combined, and the morbid appearances discoverable after death are those I have already described.

During an epidemic in 1844, of 48 cases of measles under two years of age, treated by Dr. Lees, "forty presented symptoms of pneumo-bronchitis; out of these, eighteen died; four died on the second day of the eruption, and in them I found extensive lobar pneumonia in the second stage, of the postero-inferior portion of both lungs, which I presume must have commenced previous to the eruption. In the other cases, a low form of secondary fever would appear, from the fifth to the eighth day of the disease; on the decline of the eruption, the infant had been going on well, when the mother would complain that it had passed a restless night, starting and burning with heat, particularly its hands, crying for drink or the nipple; the cheeks were flushed, there was slight cough, hurried respiration, restlessness. A loose mucous râle could be heard all over the back of both lungs, which soon became a loud crepitus, with slight dulness; the cough increased, and the infants died as if exhausted; in two of the cases, where the ordinary symptoms of bronchitis were absent, but where the dyspnœa was extreme and great pallor of the countenance existed, I found extensive lobular pneumonia; but in most of the cases I found vascularity of the pharynx, larynx, and bronchial mucous membrane; patches of lobular pneumonia, in various stages, diffused through all parts of both lungs, with a tendency to become lobar at the postero-inferior portion of one or both lungs, and in the greater number of cases, tubercles scattered through the lungs, or infiltrated with cheesy deposits in the bronchial glands."*

The symptoms are those of pulmonary disease: cough, dyspnœa; moist bronchitic or pneumonic râles, more or less intermingled, bronchial respiration, vocal resonance, dulness on percussion, &c., as heretofore laid down, but which may be overlooked in these cases, or confounded with the ordinary catarrhal symptoms by superficial observers. In every case of measles, whether apparently complicated or not, the chest should be carefully examined at short intervals, and great care should be taken lest mild cases should be rendered severe or fatal by the complication, in consequence of the neglect of needful precautions. The attack seems influenced by age: thus, the younger the child, the more liable to pneumonia; at a more advanced age, bronchitis more commonly prevails. When the complication is developed during the first stage, it seems rather an extension of the irritation of the mucous membrane than owing to any special exciting cause. At a later period, it may arise from cold, sudden recession of the eruption, &c. Occasionally pneumonia is the characteristic of an epidemic. Dr. Dewees says: "We remember to have seen it epidemic in the spring of 1785 or 1786, at which time almost every case was marked by pneumonic symptoms of greater or less violence. This disease was of difficult management; it ran its course with unusual rapidity; and not unfre-

* Dublin Journal, vol. xxvi. p. 9:

quently terminated in death; in all instances, almost, the cough was severe, obstinate, and of very long duration.”*

4. *Pleuritis*.—Guersent and Blache speak of this affection as of extreme rarity; but, if I may trust my own experience, I should be inclined to think it much more common than has been supposed. I was consulted lately about some children who had got over the measles pretty well, but who were not recovering satisfactorily. Their principal complaint, the mother told me, was a short cough and some pain in the side, but she mentioned the matter as rather trifling. Two of the children were brought to my house, and on examining carefully I detected in each, pleurisy of the left side with great effusion, and displacement of the heart. The attack may occur during the first or second period, but I suspect that it is more frequent after the measles are over, as one of their sequelæ. The symptoms may be very slight, as in the cases I have noticed, or they may be more severe, with high fever; but we shall be certain to find cough, pain in the side, occasional or constant, with dulness on percussion, bronchial respiration, vocal resonance, unequal vibration, &c. I do not know that it is a very fatal complication, unless the child be much run down by the previous illness. It is certainly very tedious, and will require considerable attention and care. As I have before mentioned, it is seldom possible to bleed, but counter irritation, with mild mercurials, and some expectorant mixture, answers very well. Diuretics I have also found very useful.

5. *Muguet, &c.*—When speaking of the various forms of stomatitis, ulcerated sore mouth, gangrene, &c., I mentioned that they occasionally occurred as secondary affections in the course of measles, but generally, also, as secondary to some disorder of the intestinal canal. It is not improbable that these diseases of the mouth are more frequently the result of the gastro-intestinal disorder than dependent upon the measles, and in treating them we must have respect to both complications. They are more frequent in cachectic infants, and in those who are ill fed, and live in badly ventilated rooms. Gangrene of the pharynx is extremely rare; much more so than gangrene of the lung, but Wunderlich mentions it as occasionally occurring on recovery from measles.

6. *Gastro-enteritis*.—*Colitis*.—Disorder of the stomach and bowels is so common in measles that few writers have omitted to notice it; and it has formed one of the divisions of several authors. “It is chiefly marked,” Dr. Copland observes, “by accumulations of sordes in the stomach and bowels; by loaded tongue; pain and tenderness at the epigastrium, hypochondria, and bowels; by morbid, bilious, and offensive alvine evacuations; by the great severity of the cough; by depression of the energies of the frame; the slower and less abundant

* Diseases of Children, p. 508.

eruption on the skin ; by weakness and frequency of the pulse ; and by severe pains in the lower limbs and forehead. It sometimes characterizes summer and autumnal epidemics, particularly during or soon after warm and moist seasons ; and it occurs sporadically in weak children during the periods of the first and second dentition, in the imperfectly nourished, and in those who have had their bowels long neglected.”*

Vomiting and diarrhœa may accompany the invasion of measles, and the stomach afterwards regain its tranquillity, whilst the irritation of the bowels continues, or both may persist. Again, as we have seen, diarrhœa not unfrequently occurs towards the termination of measles, as a critical evacuation. Or, lastly, the symptoms of functional disturbance may assume the character of inflammation, and the disease assume a much more serious aspect, with tenderness and tension of the bowels, and especially of the epigastrium. Guersent and Blache found such cases rare ; in the majority there were no *post-mortem* evidences of inflammation. They remark that gastro-enteritis may complicate measles under any of its forms, either as acute or chronic, simple, dysenteric, typhoid, or cachectic. Colitis or dysentery occasionally occurs, but more rarely, accompanied with the usual symptoms of pain, tenderness, frequent and small evacuations of mucus mixed with blood. In thirty-seven cases Rilliet and Barthez found secondary normal entero-colitis ; in six, the chronic and cachectic ; in two, the dysenteric ; and in one, the typhoid form. In neither can we estimate the amount of febrile action due to the complication, because of the fever accompanying the measles. The pulse is always quick, the tongue coated, with thirst, heat of skin, &c. It is not easy to point out the causes of this complication ; probably much is owing to improper food, and much to impure air. Certain epidemics are thus characterized. Dr. Copland states that Dr. Abercrombie, of Cape Town, described to him an epidemic prevalence of measles in the colony, which presented much of this character ; the complication with diarrhœa, or enteritis, or dysentery—or the super-vention of them during the decline of the measles, or even some time after recovery from that disease, being very frequent and uncommonly fatal.”

7. *Ophthalmia*.—We have seen that injection and suffusion of the conjunctiva, with increased secretion both of the mucous membrane and the lachrymal gland, characterized the first two periods of normal measles ; but this irritation subsides spontaneously in favorable cases, leaving a slight excess of sensibility only, for a few days. But in some cases, from the sixth to the twelfth day, the child has an attack of simple, or it may be of purulent ophthalmia, which may even ter-

* Dict. of Practical Medicine, part ix. p. 815.

minate in the loss of sight. More frequently we see the conjunctiva of the lids chiefly affected, with some degree of swelling, redness of the membrane, lachrymation, secretion of mucus, sensibility to light, and incessant itching. The attack has no effect upon the course of the eruption. It may, however, have more serious results. Dr. Battersby relates a case which ended in prolapse of the iris and staphyloma, and two others in which sloughing of the cornea occurred,* one of which died. It has been remarked as prevailing very extensively in some epidemics, as the one mentioned by Heyfelder, where it proved both troublesome and serious. Little active treatment is necessary in the ordinary forms. Fomentation with warm water, decoction of poppy-heads, or of chamomile flowers, in the first instance, with the addition of some astringent, as alum or zinc, or a weak solution of nitrate of silver when the disease becomes more chronic, and some counter-irritation, will generally be sufficient to cure the disease. When it depends upon the cachectic condition of the child, an improved diet, as convalescence advances, will act favorably upon the local affection.

8. *Otitis*.—Inflammation of the ear is not a very frequent complication, though it occurs sometimes. It may occupy the external meatus only, or it may involve the deeper structures, and occasion permanent injury. Pain, more or less acute, deafness, sensibility to sound, and pain on pressure, will generally be present, and serve to point out the nature of the attack. It seldom occurs in the first or second period of the disease, but generally when the measles are disappearing, and is caused probably by cold. Dr. Condie speaks of its occurring in children of a scrofulous habit, and of its becoming chronic. Leeches, fomentations and blisters will probably be found sufficient to relieve the disease; but for further details of these two last complications I must refer my readers to the special works upon these diseases.

9. *Hemorrhages*.—I have already mentioned a modification of the eruption of measles which appears to be the result of ecchymosis, like purpura hemorrhagica; but this disposition may extend to other internal organs, such as the intestines most frequently, the kidneys, bladder, gums, or nose. Such complications are more or less important in themselves, but far more as indications of a broken-down constitution, or a change in the composition of the blood, which may ultimately prove fatal.

10. *Eruptions*.—Measles is followed by a variety of eruptions—herpes, eczema, porrigo, &c.; either because the cutaneous excitement has left a disposition to morbid action, or because the state of the constitution is peculiarly favorable to those affections. “Porriginous eruptions on the head, and serous ulcerations behind the ears, also frequently occur, and, in some instances, induration of the mesenteric

* Dublin Journal, vol. xxviii. p. 77.

glands, and marasmus. Among the occasional consequences are herpes, boils on different parts of the body, discharges from the ears, and anasarca swellings.* Dr. Lees mentions that, in most of his cases "an eruption of vesicles appeared on the wrists and spread over the body; particularly large on the feet and ankles: it resembled scabbies in appearance, but it was not itchy, and the vesicles were flattened." Nor are these unfavorable. Dr. Armstrong remarks, that "when any cutaneous affections arise after measles, the internal organs remain free from disease; and even when some internal disorder has existed, I have not unfrequently seen it disappear on the occurrence of some spontaneous eruption of the skin."

11. *Tubercles*.—In scrofulous children a rapid development of tubercular deposit not unfrequently dates from an attack of measles. It may show itself in glandular enlargement, mesenteric disease, or phthisis: Dr. Stokes states that more cases of tubercular phthisis come under his notice, who date their first symptoms from an attack of measles, than from any of the other exanthemata. The occurrence has no essential connection with measles, but originates in the condition in which the eruptive disease leaves the constitution.

12. *Anasarca*.—This, which is so common a complication of scarlatina, occurs also with measles, but much less frequently and much less seriously. Guersent and Blache observed it from the twelfth to the twentieth day, and in favorable cases it disappeared after a few days. In some cases it was more serious; accompanied by albuminuria it terminated in death, and after death the kidneys exhibited the appearances of Bright's disease.

13. *Ulceration of the Labia Pudendi and Rectum*.—In foundling hospitals or poor-houses where many children are crowded together, and the atmosphere becomes vitiated, we occasionally find ulceration of the rectum, or, in girls, of the labia pudendi, which may either be simple or gangrenous, similar to that described by Mr. Kinder Wood, and others. Sir William Watson mentioned that, in the putrid form of measles which prevailed in the London foundling hospital, the girls who died most usually became mortified in the pudendum, and that one died of a mortification of the rectum. Dr. Lees relates two cases of ulceration of the rectum, and one in which both organs were affected, where "on dissection he found deep unhealthy ulceration situated in the inferior chordæ vocales; the mucous membrane of the trachea and larynx appeared in other respects to be normal. A large mass of crude tubercles occupied the centre of the left lung; there was vascularity and thickening of the whole extent of the rectum, with superficial ulceration extending from the margin of the anus up the mucous membrane: there was great destruction of the labia with extensive ulceration in the surrounding parts."

* Eberlè on Diseases of Children, p. 435.

Thus, at the beginning of measles, the most formidable complication we have to fear is convulsions or meningitis; during the early stage of the disease, laryngitis and broncho-pneumonia; at a later period, broncho-pneumonia and intestinal affection; and during recovery, disease of the lungs, intestinal tube, affections of the eyes, &c.

Morbid Anatomy.—M. Fabre has given the following summary of the pathology of measles, independently of the eruption. When measles terminate fatally without any complication, the organs are generally found in a state of congestion, more or less marked, sometimes of a blackish red color. Occasionally the follicles of Peyer and Brunner are enlarged, as in scarlatina and smallpox, another analogy between these diseases and typhoid fever. The blood which is found in the vessels after death is black and fluid, and the cavities of the heart contain no coagula. The results of chemical analysis correspond to these characters; the fibrine preserves its mean proportion (3 parts in 1000). M. Andral found in several adults attacked by measles, that the fibrine preserved the proportion of from $2\frac{1}{2}$ to $3\frac{1}{2}$ during the first stage, but that it diminished after the eruption. The proportion of red globules is augmented: from 129 in 1000, M. Andral found it as high as 137, 140, and 146.* Vogel placed the seat of the eruption in the epidermis; more recent researches have shown that it occupies the rete vasculosa of the skin.

I have not thought it necessary to describe the morbid appearances of any of the complicated forms of measles. I have already given the morbid anatomy of the different secondary diseases, and I must refer my readers to them.

Causes.—That measles are infectious is admitted by all, but how soon the infectious effluvium is formed, and how far it may extend, is not settled. Dr. Williams thinks that the blood throws off infective emanations during the eruptive fever, and prior to any eruption. In the epidemic among the Feroe Islands, Dr. Panure states that it was communicated from one person to another, and that out of 6000 there was not one tending to prove the existence of “morbillose miasmata.” No case occurred to prove that the contagion was communicated either during the period of incubation or of desquamation; but in all during the eruptive stage. Much will probably depend upon the virulence of the disease. It may also be carried from the sick and communicated to third parties; the party conveying it participating in the attack with the others, and at the same time. It is said also that it may be conveyed by a person who does not take the disease to third parties, and some cases I have heard would seem to justify this conclusion.

But in addition to its infectious nature, and to its facility of convey-

* Bibliotheq. du Medicin-prat., part. xvii. p. 448.

ance by woollen or porous bodies, it may also be spread by contagion and by inoculation. Vogel, Wachsel, Brown, Munro, and Tissot, produced measles by inoculation with the blood of a person laboring under the disease, or with the serum of the vesicles which are occasionally mixed with the eruption. It was hoped that inoculation might be as successful with measles as with smallpox, in exciting a milder form, but this has not been found to be the case, and the practice has never prevailed. By a recent notice in one of the Austrian medical journals, it appears that Dr. Katona, of Borsoder, in Hungary, has tested, in a large number of cases, the efficacy of inoculation for measles. In a very fatal and wide-spread epidemic, which prevailed during the winter of 1841, Dr. Katona inoculated 1122 persons with a drop of fluid from a vesicle, or with a drop of the tears of a patient affected with the disease, the fluid being inserted in the same manner as the virus in vaccination. The operation succeeded in about 93 per cent. of the cases in which it was performed, producing a mild attack of measles. A red areola at first formed around the puncture by which the fluid was inserted, but soon disappeared. On the seventh day the fever commenced, with the usual prodromi of measles; on the ninth or tenth day the eruption made its appearance; on the fourteenth, desquamation commenced, with a decrease of the febrile symptoms; and by the seventeenth day the patients were very generally well. In no one of the inoculated cases did the disease terminate fatally.

It occurs also as an epidemic, owing probably to some peculiar state of the atmosphere, and is certainly conveyed and propagated by it, and frequently an epidemic of measles follows immediately one of hooping cough, both commencing with an affection of the bronchial mucous membrane. The following are some of the principal ones:—An epidemic was observed in London in 1769, 1770, 1773, 1774, and described by Sydenham; in Upsal in 1752, described by Rozen; at Plymouth in 1741, by Huxham; in London in 1763 and 1768, by Watson; at Vire in 1772 and 1773, by Poliniere and Le Pecq de la Cloture; in Paris, in the years 6 and 7 of the Republic; by Consbruck in 1800, 1801; in Edinburgh, in 1816; in Paris in 1828, and again in 1833; in Hungary in 1841; and in the Hôpital Necker in 1843. In Boston it first appeared as a very fatal epidemic in 1713; and again in 1730, 1757, and 1772. Of late it was most frequent in the years 1821, '25, '29, '32, '35, and '46. Dr. J. Duncan has described an epidemic of measles which occurred in the North Union Poor-house, between March and June, 1842: 56 children were attacked, and 15 died; 11 were under one year, 10 between one and two years, 22 between two and five years, and 13 above five years. The complications were as follows; in 12 cases, there was pneumonia; in 13, convulsions; in 8, bronchitis; in 4, phthisis; in 5, croup; in 1, peritonitis; in 3, ulcerated tonsils; in 4, prolapsus ani succeeded; and in 5,

ophthalmia.* Dr. Lees has published a valuable paper upon the complication of measles in the epidemic of March, April, and beginning of May, 1844, at the North Union Poor-house of Dublin; 147 children were attacked, of whom 35 were between 2 and 5 years of age, and 6 died: 112 were between 5 and 12, and of these only 5 died. The chief complications were broncho-pneumonia, laryngitis, enteritis, peritonitis, &c. Dr. Coley has described a malignant epidemic which prevailed in London during the winter of 1847-8.

Such epidemics are frequently characterized by the predominance of one or other complication, and their mortality generally depends upon this, and the type of the disease.

The origin of the disease is quite unknown; it has been attributed to minute insects in the air, or to some unknown composition of the atmosphere; but we can prove nothing. It is transported, either by atmospheric influence or by individuals, to distant countries, although it is not always possible to mark its transit, and some distant lands seem to escape it altogether. Thus it is stated by M. d'Angheira to have been imported into America in 1518; and Dr. Stewart says there are no records of its appearance in North America before 1713. It appeared too for the first time at St. Helena in 1808, and the same year it returned to Madeira after an absence of five years. "A few years ago," says Dr. Copeland, "measles were introduced into the Cape of Good Hope, where they had not appeared for about thirty years, by a vessel from Europe, in which several instances occurred during the voyage."† In Australia, Van Diemen's Land, and New Zealand, I believe, it is unknown to this day.

Sporadic cases of measles are observed at all seasons; but epidemics, according to M. Andral, occur especially towards the end of winter and in the spring; so that the season of the year influences the latter, but not the former.

I have already shown that the age of the child is so far a predisposing cause, that more infants are attacked than children, and more children than adults; and I endeavored to explain this without supposing a greater inherent liability. Nor is the fœtus in utero exempt from the disease. Aildanus, Roseler, Vogel, Rosenstein, Osiander, Girtanner, Orfila, Billard, and others, witnessed cases of this kind.‡ I saw a case in which the eruption of measles appeared upon both mother and child the second day after delivery. In these cases, of course, the disease must have been communicated to the fœtus through the blood of the mother, and so far are evidences of its contagion, analogous to the cases of inoculation. From the calculations of Emer-

* Dublin Journal, vol. xxii., Sept. 1842, p. 26.

† Dict. of Pract. Med., part ix. p. 822.

‡ Ueber der Krankheiten des Fœtus, by Graetzer, p. 46.

son* and Condie, it appears that 39 deaths occurred between the ages of one and two years, and only 468 between the ages of two and 5 years. Of 1293 deaths, which occurred in London in 1842,† 53.1 per cent. occurred in children under five years, and 99 per cent. in those under ten years. Rilliet and Barthez met with 25 cases between one and two years; 72 between three and five years; 50 between six and ten years; and 20 between eleven and fifteen years.

Diagnosis.—It is, of course, very difficult to pronounce upon the nature of the disease during the first stage, nor would it be very wise to do so. The sudden access of fever, the running of the eyes and nose, the hoarse voice, &c., may well excite our suspicions, but they will not be confirmed until the eruption appears. Then the semi-circular or crescentic form of the eruption, mixed with papulæ, their elevation and their course, will clear up our doubts.

1. It may be distinguished from *scarlatina* by the distinctive form of the eruption, its elevation, and the greater disposition to affect the respiratory organs. In *scarlatina*, the eruption is diffused, and scarcely at all elevated; more, in fact, like a vivid blush than an eruption; the digestive organs are more affected, and the cellular tissue. I have, however, repeatedly met with cases in which for some time the diagnosis was extremely difficult. The eruption may resemble either disease, or one disease on one part of the body, and the other on another, and there may be an absence of the usual affections of the mucous membranes. As a general rule, if there is neither coryza, sneezing, nor coughing, I should conclude that the disease was not measles; but I am not sure that this rule is absolute. There are, however, two circumstances, either of which may determine a doubtful case. 1. Other members of the family exhibit the disease in its orthodox form, and so clear up our doubts; or, 2. Some of the definite sequelæ may follow, and be equally conclusive as to the nature of the previous eruption.

2. Some cases of *roseola* strikingly resemble measles, and no doubt have been mistaken for them; but, in general, there is little or no running of the nose and eyes, no catarrh, less fever, the eruption is more fugitive, and no desquamation takes place. Moreover, when measles attacks one child of a family, it is generally communicated to others, which is not the case with *roseola*.

Prognosis.—The prognosis in the mild uncomplicated form of measles is almost always favorable; but, although a considerable number do recover, many others die. Percival states that 91 died out of 3807 cases; Watson, that 1 in 10 in one year, and 1 in three in another, died, in the Foundling Hospital, London; Home estimates the deaths

* American Journal of Medical Science, 1827, vol. i.

† West on Diseases of Infancy and Childhood, p. 476.

at 1 in 12; M. De la Garde lost 3 per cent. We must, therefore, take other matters into consideration before forming our prognosis—the epidemic character, the type of the disease, and its complications. The concurrence of pneumonia, croup, gastro-enteritis, or dysentery, whether they prevail epidemically or not, diminishes the chances of recovery very seriously. The typhoid form of the disease is also by far the most fatal. And children of broken-down constitutions are more likely to fall victims to the complaint than those who were previously healthy. Upon the whole, measles are far less fatal than either scarlatina or smallpox. Of 167 cases, Rilliet and Barthez state that 77 were cured, and 90 died, and the conclusions they draw are as follows: 1. That normal primitive measles, simple, or with slight inflammation of the respiratory or digestive organs, is very easily cured. 2. Normal primary, but complicated measles, is cured about as often as it proves fatal. 3. Anomalous measles, primary and complicated, is as often curable as mortal. 4. Simple secondary anomalous measles is fatal to half the cases, but the mortality depends upon the primary affection, and not upon the measles. 6. Anomalous complicated secondary measles is fatal in the great majority of cases.

The favorable indications which occur during the disease are a moderate eruption, with a mitigation of the fever; a disposition to an equable moisture on the skin; a moderate or slight cough, with a mucous and easy expectoration; a free and unembarrassed respiration; a free state of the bowels, and moderate relaxation of them towards the close of the disease; hypostatic urine; a regular succession of the changes of the eruption; and no appearance of any irregularity or complication with visceral affection, the existence of which often occasions a fatal result at a more or less remote period, owing to the tendency to disorganization being greater in the local affections occurring, than when taking place primarily.

Treatment.—As the disease has a definite and regular course, we cannot attempt to interfere with that, but must content ourselves with correcting anything unfavorable in the type, and to subdue, if possible, the complications.

In a simple case of measles, very little treatment will be necessary: the bowels must be kept free, and plenty of diluent drinks allowed; the patient to be kept in bed, lightly covered, and only a very light diet permitted. The heat and prickling or itching of the skin, when the eruption appears, may be relieved by small doses of the liquor ammoniæ acetatis and spiritus ætheris nitrici. The catarrhal symptoms may be soothed by a mucilaginous mixture, with ipecacuanha, and a small quantity of morphia. Drs. Willan and Fothergill give emetics for this purpose, and they certainly seem to mitigate the fever. I quite agree with Dr. Armstrong, who observes: “From an impartial consideration of the facts which have come before me, I am con-

vinced that our plan of treating measles (in its regular form) is too uniformly active when the eruptive fever is developed; and that we should be more fortunate in the main if we interfered less with the operations of nature in cases of a mild and regular character.”* Until the disease has subsided, the diet should be moderate; it may then be increased gradually; the child must live in warm, well ventilated apartments, and every precaution must be taken to avoid cold.

In the *inflammatory form* of the disease, when not only the surface but the mucous membrane, and even the lungs, are in a state of extreme congestion or inflammation, more active measures will be necessary, and these of an antiphlogistic kind. Sydenham advises bleeding, when the fever is violent, with pulmonary symptoms. Cullen thinks it rarely necessary early in the disease. Willan and Bateman prefer reserving it until a later period, if it should then be required by the cough, dyspnoea, pain in the chest, &c.

There is no doubt that bloodletting is quite admissible in measles, if the symptoms demand it, but regard must be had to the character of the epidemic; and it is to the variations of this character that we must ascribe the difference of opinion in authors, each of whom speaks according to his experience. Thus Hamilton, Murray, and others, did not employ it, whilst Mead, Heberden, Home, Fergusson, Armstrong, &c., regarded it as a necessary part of the treatment. Dr. Dewees observes: “Therefore regard must be had to the character the measles assume, and must be treated accordingly. If fever be high, cough, and oppression severe, blood should be drawn immediately, though these symptoms occur at rather an uncommon period of the disease, namely, in its forming stage; for such changes may be imposed upon the character of measles by some constitution of the air or other cause, as to render this operation occasionally necessary.”† And he adds, that he had only bled once that season, though he had prescribed for more than 100 patients. Drs. Stewart, Condie, and West, advocate the employment of bleeding when the inflammatory symptoms run high, or any pectoral complication exists. The quantity of blood to be taken must depend partly upon the intensity of the febrile or inflammatory action, partly upon the organs principally affected, and partly upon the stage of the disease and the constitution of the child. If the child be strong, the lungs considerably involved, with a quick pulse, sufficient blood should be taken to make a decisive impression upon the disease. On the contrary, at an advanced stage of measles, with delicate children, we must use great caution, and perhaps have recourse to leeches instead of venesection.

In Germany much benefit is said to be derived from mustard poultices

* Practical Illustrations of Scarlet Fever, Measles, &c., p. 115.

† Diseases of Children, p. 570.

after leeching ; and in my own practice, I have found them very useful applications.

Other antiphlogistic remedies must also be adopted ; low diet, cooling, diluent drinks, saline effervescing draughts, &c., with a brisk purgative of calomel and rhubarb, or jalap, or castor oil. If there be no gastric irritation, we may give minute doses of tartar emetic with some expectorant, by which the cough will be relieved, and the general excitement lowered. If the skin be dry, James's powder, with a small portion of Dover's powder, may be given at bedtime, or twice in the day.

Cold affusion has been strongly recommended, or sponging the body with cold water ; and we are assured that there is neither the risk one would suppose of suppressing the eruption, nor of exciting internal inflammation.* Dr. Armstrong does not think it as suitable as in scarlatina, but he has derived great benefit from tepid affusion.†

In the *congestive* form of measles, if we detect any organic inflammation, it may be found necessary to bleed, and it will generally be found that the pulse improves afterwards. Then we may have recourse to external counter-irritants, calomel and opium, &c. Warm baths will be found of great service in exciting the cutaneous circulation, and so relieving the internal organs ; and moreover, they will favor the free development of the eruption. Diffusible stimulants are of use ; carbonate of ammonia in almond milk affords great relief in congestion of the lungs.

In the *typhoid or malignant* form of measles, bloodletting will be out of the question. Our object must be to support and stimulate the vital powers, for which purpose we must give ammonia, camphor, bark, the alkaline carbonates, the chlorides, &c. Wine also may be necessary, and good diet. Guersent and Blache speak favorably of injections of bark, the use of rubefacients, mustard poultices, or blisters to the extremities, &c.

The practitioner, I repeat, must always be guided in his treatment by the epidemic character of the season, and by the peculiarity of the epidemic of measles. Thus, purgatives must be cautiously administered when gastro-enteritis, or diarrhœa, or dysentery prevails ; bloodletting used warily when diseases have a typhoid or adynamic character. In inflammatory epidemics, such as that described by Mead, Armstrong, &c., bleeding is highly beneficial ; but in the one that prevailed in Paris in 1828, although it was frequently complicated with inflammation of the lungs and other organs, M. Biett states that it was not benefited by bloodletting.‡

* Bateman on Cutaneous Diseases, p. 61.

† Practical Illustrations, p. 163.

‡ Report in Jour. Hebdom., No. 42.

Special treatment will be required for each of the complications, whether of the brain, lungs, or gastro-intestinal canal; but of this I have so fully spoken under the head of each of these diseases, that I need not recapitulate the matter here.

CHAPTER II.

SCARLET FEVER. SCARLATINA.

THE second of the eruptive fevers I shall notice is scarlatina. Like measles, it is preceded and accompanied by fever; and after a few days, a rash appears which is general, and of a vivid red, with much irritation of the mucous membranes, especially of the throat and stomach; it runs a definite course; occurs epidemically; may be propagated by infection or contagion, and ordinarily attacks a person but once in a lifetime. Its cause and history have so much resemblance to measles that for a long time they were confounded, but the eruption is quite different in its general diffusion, and the digestive mucous membrane, rather than the pulmonary, is chiefly affected.

It is a disease of infancy and childhood emphatically, and I believe for the reason I have already mentioned, viz: that being highly infectious as well as epidemic, the child takes it the first time it is exposed to its influence, which is pretty sure to happen before it has passed many years, in consequence of the frequent prevalence of the disease. Of 2614 cases recorded by Mr. Farre in his Fourth Report, 2419 were children, 182 adults, and 13 aged persons.

Dr. Copland says that it is doubtful whether scarlet fever was known to the Greeks and Romans. Ingrassias is said by Hildenbrand and Frank to have been the first to distinguish the disease. Cottyer published an account of an epidemic which resembled scarlatina, and which prevailed in Poitiers in 1557. And Forestius states that the epidemic at Amsterdam in 1517, which was described by Tyengus, was this malady.* Mercatus (1672), Heridia (1626), Sgambatus (1620), Ætius Clerus (1636), Senner (1625), Sydenham, Sibbald, Morton, Fothergill, Heberden, De Haen, &c. &c., have since described the dis-

* Dict. of Pract. Med., part xiv. p. 665.

ease. It first appeared in Spain in 1610, in Naples in 1618, in London in 1670, and in Edinburgh in 1680.

We can only form an approximate estimate of the frequency of scarlatina. Dr. Copland has given the number of deaths from scarlatina, measles, and smallpox, in the eleven years from 1838 to 1848 inclusive, and those are: from scarlatina, 20,962; from measles, 14,632; and from smallpox, 13,079. "In only three of these years have the deaths by measles been greater than those of scarlatina, and in only two has the mortality from smallpox exceeded that of scarlet fever." Mr. Wilde observes that it is "the tenth most fatal of the epidemic class of diseases, and destroyed (in the ten years) 7886 persons, the sexes being in the proportion of 100 males to 95.97 females. With the exception of cholera, this disease has proved more fatal in towns, and among large and closely united masses of the population, than any other epidemic of this country, being one death in 24.63 of the epidemic affections in the civic districts, and but 1 in 65.07 in those of the same class in the rural districts or open country. The deaths specified from this cause are in the proportion of 1 in 150.56 of the total recorded mortality, and 1 in 48.34 of the entire epidemic or contagious diseases." . . . "In the years 1835-36, and part of 1837, the mortality from this disease rose from 620 to 840, 1074, and 1040, being then the forerunner of the fever and smallpox which prevailed in 1837, 1838, and 1839, during the continuance of which diseases it fell, but again rose up, then declined in 1840."* In the tables of mortality of Philadelphia, U. S., published by Dr. Emerson, it appears that in twenty-four years the mortality from scarlatina was 143 under twenty years of age; and during the first twenty years of this period, there were 654 deaths from measles.† During the ten years preceding 1845, Dr. Condie states that there were 2154 deaths from scarlatina, and only 574 from measles. Guersent and Blache have added together the cases collected in 1138-9, by Roger, Rilliet and Barthez, and Barrier, and find that there were 157 cases of scarlet fever, 264 of measles, and 213 of variola and varioloid.‡ Dr. Gregory mentions that the deaths from scarlatina in 1837 in London were 2520; in 1838, 5802; in 1839, 10,325; and in 1840, 19,816. Thus we cannot draw any accurate comparisons of the frequency of measles and scarlatina, or estimate precisely the frequency of either disease. The irregular occurrence of an epidemic of either disease, or its unusual severity, will effectually disarrange our statistical calculations.

Scarlatina may be either *primary* or *secondary*, normal or abnormal. By most writers it has been divided into three varieties, scarlatina simplex, scarlatina anginosa, and scarlatina maligna. I shall adopt

* Report on the Table of Deaths, p. 13.

† American Journal of Medical Science, 1827, vol. i.

‡ Dict. de Med., vol. xxviii.

the same plan as with measles, and first describe the ordinary form of scarlatina, and then the deviations or modifications.

We may notice three periods of the disease.

1. *The Period of Invasion.*—The term of incubation, from the moment of receiving the infection to the development of febrile symptoms, varies in different patients: it may be only a few hours, or it may extend to ten or twelve days; in some cases of Dr. Maton's it appeared to be twenty-four or twenty-five days.

The earliest symptoms which manifest themselves are general uneasiness, lassitude, depression, aching in the back and limbs, rigors, loss of appetite, and thirst. Soon afterwards the patient complains of stiffness and pain in the throat, with difficulty and pain in swallowing. The skin becomes very hot, the pulse quick and full; occasionally there is nausea and vomiting; always pain in the loins, headache, and either drowsiness or sleeplessness. When the initiatory fever runs very high, there may be delirium or even convulsions; the latter especially, if the infant be teething—but seldom more than one or two. The face is congested, swollen, and red; the eyes injected, and sensitive to light. If the fauces and throat be examined, they will be found puffy, red, and inflamed, and the tonsils swollen. The tongue is white or yellow, and loaded at the base, but red at the point and edges, with prominent papillæ. The fever during this time seems rather to increase, the skin is hot and florid, the thirst intense, and the pulse very quick. The bowels are generally confined, the urine scanty, high-colored, and voided frequently; sometimes it is albuminous, but more commonly so at a later period. After these symptoms have continued for a time, varying from one day to four or six, the eruption makes its appearance.

2. *Period of Eruption.*—At first there appear a number of minute red points, on a rose-colored ground, about the face or neck, sometimes on the trunk or extremities. These rapidly increase, spread, and coalesce into large patches, which increase and coalesce until the entire surface of the face, body, and limbs, is covered. Or the face and body may be occupied fully by the rash, whilst it exists in irregular patches on the limbs. Neither the minute red points, nor the large patches, nor the generally diffused rash, have either tangible or visible prominence; the skin feels rough if the finger be passed over it, and the surface of portions, as the face, may be swollen; but the characteristic appearance is that of a vivid scarlet color, like that of a boiled lobster, without papulæ; very different from the irregular, semicircular or crescentic, somewhat elevated eruption of measles. Under pressure, the bright scarlet color disappears, and returns when the pressure is removed.

The skin is burning hot, dry, and rough, resembling "goose-skin" to the touch; the itching is often intense, and the face, feet, and hands are considerably swollen. The pharynx is of a vivid red; the tonsils are red, swollen, and often covered with white pultaceous secretion in

patches; the swelling of the tonsils may be perceived externally, and the submaxillary glands are also enlarged. The coating of the tongue gradually peels off, until it presents the appearance peculiar to this affection; it is dark-red, dry, and shining as if varnished, with prominent papillæ, something like the surface of raspberry jam, if I may use so homely a comparison. On certain parts of the body, as the neck, axillæ, folds of the arm, &c., we find occasionally an eruption of miliary vesicles.

The fever generally subsides in some degree upon the appearance of the rash, and continues at that point until it finally disappears. The heat of the skin during the eruption is very great; Hasse, Cuvier, Andral, and Rayer, have found it to range from about 90° to 112° Fahrenheit. When the attack is severe, or during a paroxysm, the countenance is excited, but expressive of suffering; the eyes are bright; there is restlessness, agitation, or delirium, and the patient is generally sleepless; the respiration is hurried, and often impeded; the constipation may be replaced by diarrhœa to a certain amount, accompanied with slight colic.

It is chiefly during this period that the more serious complications are developed. "After five, six, or eight days," Guersent and Blache observe, "that is, after a longer time than was required in measles, the exanthema gradually subsides; it assumes a violet tinge, then a pale rose, or slight copper color. Most commonly the mucous membrane of the mouth remains red, sometimes it is at this period only that the tongue, throwing off its white coating, presents the prominent papillæ, and the characteristic redness. The swelling of the parts diminishes simultaneously, but gradually."*

3. *Period of Desquamation.*—Somewhere, then, between the fourth and ninth day desquamation commences. If the attack have been severe, the fever high, and the eruption abundant, the process may commence before the disappearance of the rash, but more generally it is after its decline, during convalescence, or perhaps not until a week or two after its disappearance. It observes pretty much the order in which the eruption appeared; the miliary vesicles drying first. When the eruption has been very slight, the desquamation is sometimes scarcely perceptible; in other cases the epidermis is detached in very minute powdery particles, like flour; more frequently, however, it comes off in scales of varying sizes, or in strips from those parts where the epidermis is very thick, as the hands, fingers, soles of the feet, &c. The epithelium of the tongue is also cast off, leaving it of a vivid red color, and sometimes very tender. The hair commonly falls out in great quantities, and several writers have noticed the nails falling off. Dr. Graves mentions a case of this kind. This process may last from eight to fifteen days, or even longer, from thirty to forty; but then

* Diet. de Méd., vol. xxviii. p. 153.

we observe repeated exfoliations. Occasionally the skin becomes universally sensitive during desquamation, and with some infants the slightest contact is very painful. Other children suffer from a kind of rheumatic pain in the limbs or joints, but chiefly in the wrists, during this or the preceding period, which does not, however, last as long as ordinary rheumatism.

Sometimes between the fifth and eighth day, or sooner if the attack be slight, we find the pulse become quiet, the surface cooler, though the skin is still dry and rough, and the affections of the digestive or respiratory mucous membrane diminish, and finally disappear. The throat ceases to be painful, the swelling of the tonsils subsides, and the pharynx and vault of the palate lose their scarlatinous redness. Abundant alvine evacuations, profuse sweating, or more rarely nasal hemorrhage, mark the critical termination of scarlatina.

Thus the entire duration of the disease will vary much, as well as each stage. In the mildest form, it may occupy five or six days; in others, several weeks.

Modifications.—I have thus sketched a marked but simple case of scarlatina. Our next point is to notice the principal modifications which may arise in the character of the eruption and its course, or in the type of the disease.

1. The eruption may be partial, occupying only the face and hands, the neck and chest, or the flexures of the joints. Or the redness may be in extremes, either very slight or very deep; or a number of violet-colored points may be interspersed, or a crop of miliary vesicles, the *scarlatina miliformis* of P. Frank; these vesicles are sometimes mixed with sudamina or papulæ, but very rarely with pustules. Reuss, Raimann, and Hildenbrand have observed, in rare instances, the eruption, on the second day of the efflorescence, of bullæ of a dark-red color, above the size of a nut, containing a yellowish serum, and resembling those produced by blistering plaster. The cuticle breaks, and, the fluid being discharged, a sore remains, which follows the course of the constitutional malady. This is the *scarlatina pemphigoides* of Hildenbrand. In the severe forms of the disease, the eruption may assume a dark-red or livid color, occasionally interspersed with petechiæ of various sizes, or even large patches of sanguineous effusion, constituting the *scarlatina purpura*. Most writers have noticed the appearance of miliary vesicles. Rayer mentions having seen coincident eruptions of variola and chicken-pox.*

2. There may be also deviations from the usual course of the disease; the initiatory fever may be either longer or more brief than usual, and the eruption consequently make its appearance after four, five, or six days, or almost simultaneously with the outbreak of the fever. In four out of seven children in one family, the children were free from

* Dict. de Méd. et de Chir. Prat., vol. xiv. p. 541.

any symptom whatever until vomiting took place, after which the disease ran its usual course. Two of my own children were apparently quite well up to 5 P.M., when they were suddenly attacked by vomiting, followed by fever; and in the morning they were scarlet, but without sore throat, and had little or no desquamation. This absence of sore throat, or any other specific complication, if the rash be not very characteristic, renders the case very puzzling, and, in fact, we may not be able to pronounce positively upon the case until either the disease attacks other members of the same family, or some of the peculiar sequelæ make their appearance.

The rash may die away unusually quickly, or remain longer than ordinary, or it may recede from especial causes. I have already mentioned its recession and reappearance in some cases.

Lastly, the desquamation may be scarcely perceptible, or may occupy weeks.

3. It appears also, from very good evidence, that a child may have scarlatina without the eruption, or die before the eruption appears. Some have doubted this; but it is maintained by Huxham, Fothergill, Stoll, Dance, Guersent, Graves, Trousseau, and others. We may see the disease run its regular course with several members of a family, and perhaps one of them will exhibit all the constitutional symptoms, fever, sore throat, &c., without any rash upon the skin. I have seen two well marked cases of this kind where the child sank into a kind of collapse after vomiting, and died in a few hours without another symptom—six or seven of the family having the disease well marked at the time. I have seen another in which convulsions occurred, and we were not sure that we ever perceived the rash. One of my own children had sore throat, but we could not decide that it was scarlatina, until some of the sequelæ appeared.

We may perhaps go further, for Dr. Copland believes that “a child in the same house or family, in which scarlet fever is unequivocally present, may have the constitutional affection, not only without the characteristic eruption, but even without the sore throat also; both these essential features of the malady being either entirely wanting, or so slight and evanescent as to escape notice.” This Dr. Copland believes to be true scarlatina, though *latent*. Dr. Graves has related a case of a young lady who was in constant attendance upon her sisters during scarlatina, and who exhibited no symptom of the disease, but who was attacked by the anasarca of scarlatina after the other children were convalescent.*

We find such occurrences more common in certain epidemics than in others, but it is always necessary to regard them carefully and cautiously, for it should not be overlooked that sore throat and fever, both the local and constitutional affections being characterized by

* Clinical Medicine, vol. i. p. 347.

remarkable asthenia, amounting even to putro-adynamia, may occur sporadically or endemically, or even epidemically, independently of any connection with scarlatina, and amongst persons and families who have already been the subjects of scarlatina. Of these occurrences I have met with several instances, the greater part of a family, all of which had previously had scarlet fever, having been thus attacked.

The modifications which depend upon the type of the epidemic, or perhaps upon the constitution of the patient, have been usually divided into three varieties: 1, the scarlatina simplex vel mitis; 2, scarlatina anginosa; and 3, scarlatina maligna. This peculiar type varies in different epidemics, owing to the "*constitutio morborum*," as it has been called. Thus, for years, all the scarlatina may be attended with inflammatory symptoms, then an epidemic may occur of a typhoid character, and as other diseases illustrate the prevailing constitution, by ascertaining that, we may and ought, in some degree, to be prepared for the type of the epidemic of scarlatina. Rilliet and Barthez give three forms, answering nearly to the above. In the first, the symptoms are very slight, as it were incomplete; in the second, the eruption is slight and benign, but the general symptoms are severe, and run an irregular course; in the third, the typhoid character pervades all the symptoms.

1. *Mild Scarlatina* may prevail in certain districts, or even epidemically. Cases of it also occur during severe epidemics, and may be followed by dropsy or other of the ordinary sequelæ. It is characterized by the moderate character of the symptoms I have already described. The initiatory fever is short and slight; the eruption moderate and brief; the fever mild; the throat but little distressing, although on examination it exhibits its usual character; the desquamation trifling, perhaps inappreciable. The entire course of the disease is short, and patients recover from it rapidly and completely, unless from imprudence some of the usual complications or sequelæ should occur.

2. *Scarlatina Anginosa*.—In this variety the description I have already given of the disease is considerably aggravated. The fever is intense; the inflammation of the throat severe, and the tonsils much swollen, and covered with patches of whitish or grayish lymph; the temperature of the body often rises to 104, or even according to Dr. Condie, to 112; the pulse is rarely under 120; the tongue is white, and loaded with enlarged papillæ. The eruption may appear upon the third day, or not till later; sometimes it disappears and returns; in some cases it is faint, but in most very well marked. The skin is burning, the thirst excessive, and the difficulty and pain of swallowing very considerable. Delirium is very common as the fever increases towards night. But the point of most importance, next to the inflammatory character of the fever and the severe affection of the throat, is the liability to internal complications, either of the brain, lungs, digestive organs or kidneys, &c., of which I shall speak pre-

sently. This form of the disease may characterize the epidemic or individual sporadic cases, nor is it the most dangerous form.

3. *Scarlatina Maligna* may commence like the latter variety, and may, by degrees, assume its peculiar typhoid character. It usually, however, presents an asthenic or typhoid character from the beginning, especially in autumn and winter, in patients of a debilitated constitution. "The patient is first affected with languor, lassitude, weakness, and vague pains through the body. These are succeeded by chilliness or shivering, followed by great heat. These latter alternate for several hours, until at last the heat becomes more constant and intense. The patient then complains of faintness, great pain in the head, and of violent sickness, with vomiting or purging, or both, especially in children, more rarely in adults. Heat and soreness are felt in the throat, and stiffness and tenderness in the neck. The face soon appears red and flushed, swollen or bloated, occasionally pale and sunk; the eyes are red, watery, heavy or suffused. There are great fretfulness, restlessness, anxiety, lipothymia or faintness, and remarkable dejection of spirits. The pulse, from the first, is quick, small, and fluttering; in some, soft and full, but weak and irregular, but always without that firmness and strength observed in inflammatory diseases. Dr. Johnston remarks that if blood be taken from a vein soon after the attack, instead of forming a firm crassamentum, "it continues in the state of gelatinous texture." The urine at first appears crude, like whey; as the disease advances it becomes yellower, as if bile were diluted with it, or turbid, scanty, high-colored, and sometimes it contains dissolved or decomposed blood-globules. At the same time, at or soon after the attack, the fauces, uvula, tonsils, and pharynx become red and swollen, and soon afterwards covered in parts by ash-colored or dark exudations, which appear as sloughs. The tongue is now deep red or brown, dry and glazed, and sometimes so tender and chapped as readily to bleed. The throat soon acquires a dusky red, brown, or livid hue, and the exudations on the fauces and tonsils are darker, and often cover gangrenous ulcers. The febrile or constitutional disturbance presents an extremely typhoid or asthenic character, or putro-*adynamia*. The skin is hot, but there is little thirst, although the mouth is dry, and the teeth and lips are covered by sordes, or by an acrid fluid from the excoriated or ulcerated sore throat. The breath is remarkably foetid and contaminating."*

It may, however, commence mildly, and to a certain extent progress very favorably to all appearance, when suddenly the throat again becomes sore, and the parotid and submaxillary glands swollen and painful, and typhoid symptoms of the worst kind set in. Dr. Graves has given a very graphic account of this variety, to which, and to all his most valuable observations upon scarlatina, I beg to refer the

* Copland's Dict. of Pract. Med., part xiv. p. 670.

reader.* Dr. Armstrong observes, that it is "in general only when fever is protracted beyond the fourth day that the ulcers are converted into ill-conditioned, black, and fœtid sloughs. At the commencement the affection of the throat may be only pseudo-membranous pharyngitis; but at a more advanced stage, and in bad cases, ulceration takes place and assumes a gangrenous character."

The eruption may appear on the second or third day, or not until later, and then it has not its usual florid appearance, but rather resembles a dusky red stain. It may disappear and return, and it may be accompanied by petechiæ, or some degree of œdema. The parotid and submaxillary glands are swollen and tender, and the neck and throat become œdematous, with great dyspnœa. There is an acrid discharge from the nostrils and mouth, the angles and edges of which are excoriated by it, and the mouth often assumes an aphthous appearance. The gangrenous ulceration of the throat may extend up the Eustachian tube, and the tympanum and bones of the ear be destroyed by it, an acrid offensive discharge escaping from the ear. When the disease has assumed a particularly violent character, collapse supervenes towards the middle or end of the second week. Great prostration of the vital energies now ensues; the pulse becomes very frequent and feeble; the heat of the surface sinks; the tongue is dark brown or black; exhausting diarrhœa often takes place; and, in some cases, hemorrhages from various parts, and petechiæ, occur towards the fatal termination of the complaint.† The febrile excitement in children may run on into a low muttering delirium, or perhaps more frequently into stupor and coma. "In the more violent cases the efflorescence either disappears or becomes livid, the fauces are black and the breath most offensive; the eyes lose their lustre, and the swelling of the neck increases. The stools and urine are evacuated involuntarily; the former being frequent, watery, and most offensive, sometimes bloody; the latter putrid, brownish, or suffused. The surface becomes cool; the countenance bloated, cadaverous, or œdematous; the parts pressed upon, excoriated or sphacelated; the tongue brown, hard, or dry; the breathing labored, or interrupted by singultus; and death follows with insensibility, congestion of the lungs, and great alteration of the state of the blood, and of all the circulating and secreted fluids."‡

In several cases of fatal malignant scarlatina that I have seen, the eruption was not unfavorable, perhaps less florid and profuse than usual, but not unusually so, and the patients had but very slight sore throat; but the case exhibited marked typhoid symptoms, with dry, dark, loaded tongue and sordes about the teeth, and ran on into coma, and sometimes convulsions. Death may occur as early as the second day,

* Clinical Medicine, vol. i. p. 318.

† Eberle, Diseases of Children, p. 449.

‡ Dict. of Pract. Med., part. xiv. p. 671.

either from the laryngeal, pharyngeal, or cerebral complications, or at a later period from the cerebral or pulmonary complications, or from the morbid state of the blood.

This phase of scarlatina is distinguished from the others by the typhoid character of the fever, the malignant affection of the throat, and the adynamic complications of the cerebral, thoracic, or abdominal organs. As to the comparative frequency of the different forms, Dr. Willan states that in 1786 he saw thirty-nine cases of malignant, to 152 of the anginose variety; and Dr. Clarke, of Newcastle, had thirty three cases of malignant to seventy-three of the anginose form.

Dr. Armstrong has described three varieties of malignant scarlatina: the inflammatory, the congested, and the mixed. The first commences, like scarlatina anginosa, with considerable inflammatory excitement, but, after a few days, collapse and a typhoid condition supervene; the vital powers sink, the throat becomes gangrenous, and the other characteristic symptoms appear. It answers to the putrid variety of Richter. The second is characterized by a want of reaction: "The subjects of this modification are for the most part suddenly attacked. They become pale, faint, and sick, and chiefly complain of pain, load or giddiness in the head, extreme oppression, and much uneasiness in the region of the heart or at the pit of the stomach. Sometimes they at once sink, as if overcome by an uncommon shock, and lie in a state of confusion and oppression without making much complaint. At other times they walk about, pale and languid, for two or three days, and then take to their beds like persons completely worn out by some great fatigue or mental anxiety. When the attack has once decidedly occurred, the respiration is either quick and anxious, or slow and impeded. There is often a mixture of livor and paleness in the face; the eyes are frequently dull, but sometimes glairy, and they acquire a fatuous or inebriated expression in the course of the disease. The mind, at first alarmed, confused, or dejected, soon becomes disordered with delirium; or an indifference to surrounding objects and a stupor succeed, under which patients finally expire. From the beginning, the pulse is generally low, quick, and irregular, and commonly continues so to the last; but in those cases where there is a very slight degree of reaction, it sometimes has a short and rather sharp feel for a certain period, and finally grows weak and undulating. At first the tongue is commonly whitish in the middle, paler than natural, and covered with a slimy saliva, but towards the close it often becomes rough and darkish, and then the breath is usually offensive. The bowels are commonly distended with flatulency, constipated or irregular in the first stage, but frequently loose in the last. The fæces are sometimes darker, at other times lighter than natural. The stomach is often extremely irritable; yet occasionally it retains everything that is taken, though the deglutition becomes more difficult as the disease advances. This form of the scarlet fever frequently runs its fatal course in two, three, or four days from the occurrence of the extreme

general oppression ; and there are almost always appearances of putridity in the last stage, such as oozings of blood from the mouth or nostrils, dark hemorrhages from the bladder or bowels, inky petechiæ, or gangrenous spots upon the skin. A few hours before death there is often a superficial glow of heat diffused over the body, accompanied with a darkly flushed face, high breathing, accelerated pulse, and partial or general sweats. But this mere semblance of excitement soon subsides ; the extremities grow cold, the face assumes a cadaverous hue, and when the skin is pale it often has almost the smooth waxen appearance of the surface of a corpse.* In this form the eruption is of a purplish or copperish color, deepening as the disease advances, and sometimes quickly disappearing. In some rapid and fatal cases the throat is but lightly affected ; in others there are specks or sloughs on the fauces, but not disproportioned to the amount of general disease. These varieties, as I have already observed, depend partly upon the condition of the child and partly upon the character of the epidemic, some assuming the form of scarlatina anginosa, and others of scarlatina maligna.

A very interesting question arises as to the increase in the intensity of the poison in proportion to the number of children affected in the same house. In one family where seven were attacked, the two last affected exhibited the worst typhoid character of fever, but with very slight sore throat ; one died on the third day, and the other on the sixth.

The last modification I shall notice is, when the disease occurs a second time in the same person. No doubt, as I said of measles, that in many cases which are popularly deemed a second attack of scarlatina, one of the affections was roseola ; but there are undoubted cases on record of the recurrence of scarlatina, although they are rare. Willan observed no such case. Jos. Frank and M. Rayer each met with one case. Heberden says that such cases occur. Dr. Wood saw five in forty-five cases. Berton, Rilliet and Barthez, and Heyfelder, mention one case each.† Dr. Burns mentions two instances. Dr. Bateman regards such cases as exceptions to a general rule. Bicker,‡ Newman,§ and Burns, deny that the susceptibility is invariably removed by one attack. Richter observes that a second and even a third attack has occurred.|| Dr. Meigs, jun., mentions the case of a person who had the disease two years previously under the care of his father.¶

* Practical Illustrations of Scarlet Fever, &c., p. 21.

† Dict. de Méd., vol. xxviii. p. 173.

‡ Beschreibung eines Scharlachfiebers, p. 162.

§ Aufsätze und Beobacht. für Aertze, p. 284.

|| Specielle Therapie, vol. ii. p. 440.

¶ Diseases of Children, p. 448.

*Complications.**—The complications of scarlatina vary much as to the period at which they occur, ranging from the earliest incursions of the disease until weeks after its apparent cure. They differ also in character, in part owing to the violence of the attack, in part to the character of the epidemic, and a good deal according to the constitution and habits of the patient. They are quite different among the starved, ill-fed, scantily-clothed children of the poor, from those met with among the rich. Something also depends upon the age of the child, as an infant who is teething is much more liable to convulsions or head affections.

1. *Affections of the Mouth.*—When speaking of muguet, aphthæ, ulcerated sore mouth, and cancrum oris, I mentioned their occurrence during the course of scarlatina. In ordinary scarlatina anginosa, we may frequently perceive a disposition to the deposition of lymph upon the tonsils in the early stage of the disease; but if the case be favorable, it extends no further into the mouth. But in some of the severe cases of scarlatina maligna, in an advanced stage, aphthæ, or ulceration, may be observed in the mouth or about the gums; and these ulcers may take on a gangrenous character, and become converted into cancrum oris. Such a complication would probably itself insure a fatal termination, were it not that in most cases that is secured by the general typhoid form of the fever, and the gangrenous condition of the throat.

2. *Pharyngitis.*—In its moderate form, we can hardly call this a complication of scarlatina; it is rather a part of the disease itself. It commences during the preliminary fever, with redness and swelling of the fauces and throat, with soreness and difficulty of swallowing. Soon afterwards slight patches of false membrane appear upon the tonsils, which may coalesce and extend to the neighbouring parts; the submaxillary glands and tonsils are felt externally to be much enlarged and tender; deglutition is impeded; the fluids, or a portion of them, are regurgitated; and the speech is less clear than usual. If the complication be very extensive and severe, it will predominate over the other symptoms: the febrile reaction becomes intense; the oppression great; respiration impeded; the cough frequent, rarely clear and sonorous, but also rarely hoarse or lost; the face is excited, but in some cases expresses prostration, anxiety, and suffering; and, the disease continuing to make progress, the patient dies when the angina has existed from five to ten days. But this pseudo-membranous pharyngitis is by no means the worst form of sore throat met with in

* I would take the liberty of referring my readers to Dr. H. Kennedy's little volume on scarlatina, as containing a valuable series of facts illustrative of almost all the complications of scarlatina, as they occurred for a number of years in this city, carefully noted and simply related.

the severe forms of scarlatina. Instead of the whitish patches lying upon the inflamed but unbroken mucous membrane, we may find ulceration of the tonsils, spreading to the pharynx, and exhibiting an unhealthy, grayish surface, which speedily assumes a gangrenous character. Or we may find the pharynx, tonsils, and fauces, covered more or less with grayish or brownish patches, underneath which ulceration of an unhealthy character is going on; and by and by, when these membranous layers are thrown off partially or wholly, we may discover ulcers of various shapes and extent, but generally deep, which assume a gangrenous appearance. In whichever way it commences, we may have very shortly to deal with that very formidable and fatal affection, gangrene of the pharynx, or putrid sore throat, which I have heretofore described, and the danger of which is increased by its occurrence in the course of a typhoid form of disease.

3. *Gastro-enteritis*.—This is seldom a very formidable, though by no means a rare complication, unless it should prevail epidemically at the same time as scarlatina. Vomiting not unfrequently occurs during the first stage, or even the second, but rarely afterwards. Diarrhœa often marks the crisis when the disease is about to decline, and so far may be rather beneficial. Dr. Copland mentions that, in the cases in which this complication occurred, the eruption was either suppressed, partial, scanty, or prevented from appearing; the throat, moreover, being more or less affected. Dr. Graves noticed vomiting and purging, accompanied by abdominal tenderness, and he attributes it to cerebral irritation and congestion, as in hydrocephalus. Dr. Gregory speaks of a low degree of mucous enteritis accompanying the decline of scarlatina, and, in bad cases, ending in ulceration of the mucous membrane, with bloody stools. But in the scarlatina maligna we have occasionally a very severe attack of diarrhœa at an advanced stage, with flatulence, tympanites, and some degree of tension and tenderness. Although at this period, and in this form of disease, the gastro-enteric affection does not constitute the principal danger, it certainly adds to it, and may hasten the fatal termination.

4. *Coryza*.—In some cases the inflammation of the mucous membrane of the throat is extended to the nose, and there is irritation, sneezing, &c., with a mucous or muco-purulent discharge. In the advanced stages of scarlatina maligna there is an acrid discharge, which excoriates the edges of the nostril. But this complication is of no importance; it is but a symptom, though an unfavorable one, and has no bearing upon the issue of the disease.

5. *Laryngitis*.—In some cases, though not very frequently, when there is much oedematous swelling of the neck, the glottis and neighboring parts participate in the affection; and from the situation of the glottis a sudden incursion of œdema may prove very serious; in fact the child may be choked very suddenly. We should, therefore, always be prepared for this occurrence, and watch the throat very carefully. It is, however, very rare. Simple laryngitis may also complicate scar-

latina, though it is not common. It is much more probable that the diphtherite will extend to the larynx, and give rise to the symptoms of secondary croup,* as in the cases described by Dr. O'Ferrall. Such an addition to the original disease, will, of course, add to its formidable character. It rarely occurs during the period of invasion, but generally about the appearance of the eruption, or soon after. I do not know that there are any cases on record of gangrene of the larynx in scarlatina. I have never seen it; but I can easily suppose that the gangrene might extend from the pharynx to the larynx.

6. *Pneumonia*.—In severe attacks of scarlatina anginosa, the lungs are much congested, or even occasionally inflamed; but it does not appear to be at all so common as in measles. In the congestive form of scarlatina maligna, the lungs participate in the congestion of all the internal organs, and this congestion may run on into inflammation. During convalescence, if the child be exposed to cold, he may very probably suffer from an attack of pneumonia.

7. *Pleurisy*.—This complication occasionally occurs in scarlatina, sometimes during the first or second stage, when inflammatory symptoms run high, but more frequently when the eruption is declining, or during convalescence. Both this secondary affection and pneumonia are of such importance that we should be ever on the watch to detect their earliest symptoms.

8. *Cerebral Affections*.—I have already mentioned that the child may be attacked by delirium, headache, stupor, convulsions, coma, or paralysis. These may occur at any period; headache and delirium occur generally during the first stage, and are but rarely permanent. However, they may assume a more serious character, and prove fatal. One child of a patient of mine died suddenly of apoplectic congestion of the brain just as the eruption was appearing. Her sister sank into a state of stupor and died suddenly without convulsions. MM. Guersent and Blache mention a case in which delirium, with loud cries, came on during convalescence, with vomiting, but no other symptom, and lasted some days. Rilliet and Barthez mention that cerebral complications proving fatal, are more frequent in scarlatina than any other fever. I saw a case in which the head symptoms were relieved by bleeding, and the child was apparently going on well, but two or three days afterwards, without warning, convulsions attacked the child and proved rapidly fatal. Dr. Graves mentions several cases in which convulsions occurred on the first or second day, followed by coma, and ending fatally.† Generally speaking, there are but one or two convulsions; but, in other cases, I have known the convulsions continue with all the other symptoms of meningitis, and prove fatal. Low, muttering, delirium occurs in scarlatina maligna. During the desquamation and con-

* Graves, Clinical Med., vol. i. p. 320.

† Clinical Medicine, vol. i. p. 313.

valescence, the nervous symptoms which occur, the coma and paralysis which come on suddenly, seem to be connected in many cases with the dropsy, of which I shall speak presently. On dissection, the cause of cerebral symptoms is seen to be owing sometimes to excessive congestion of the brain, and sometimes to inflammation of its membranes,* or effusion into the ventricles.

9. *Diffuse Inflammation and Glandular Swellings of the Neck.*—We have seen that the tonsils and submaxillary glands are more or less swollen, and in some cases the parotids, one or both, participate in this enlargement, which may be very considerable. And not only that, but the entire neck may be so much swollen from cellular œdema as to place the patient in much danger of suffocation. Dr. Graves and Dr. H. Kennedy describe this as a very formidable complication. Sometimes it attacked the patient during the height of the eruption, in others after the constitutional symptoms had in a great measure subsided. It spread with great rapidity round the neck, which became immensely enlarged, the swelling extending from the face to the clavicles, in some cases, and in one, involving even the pectoral muscles. At first it appeared to consist of serum, afterwards unhealthy pus, either infiltrated through the tissues or collected into small abscesses, or forming one large one. In many cases, sloughing of the most formidable character set in, with great destruction of tissues and occasional and even fatal hemorrhage. The edges of the sores while sloughing were either of a dark red or livid hue, and in two or three instances quite black. Dr. Kennedy has mentioned another species of swelling which was caused by the effusion of lymph; the neck became swollen and very hard, and very rarely small abscesses formed. It was also sometimes more limited in extent than the diffused inflammation. Dr. Osbrey has described a very formidable and fatal complication of diffuse inflammation of the neck which he noticed in the epidemic of 1840–41. “The progress,” he says, “of the inflammation was very insidious, in most cases commencing as an indurated swelling behind the angle of the jaw on one side, which was at first very indolent, without any discoloration of the integuments, but as the affection advanced the swelling increased much more rapidly, often extending to the opposite side; the integuments then assumed a dusky red appearance, and became very tender to the touch; there was œdema, so that the part readily pitted, when pressed by the finger, and there was an obscure sense of fluctuation communicated to the touch. In the advanced stage of the complaint, sensibility, which was previously great, diminished to such a degree that the child did not seem to suffer much pain, if incisions were made into the swelling. When the patient survived till about the tenth day from the com-

* Guersent and Blache, *Diet. de Méd.*, vol. xxviii. Rilliet and Barthez, *Mal. des Enfants*, vol. ii. p. 620.

mencement of the affection, sloughs frequently formed, commencing in dark purple specks over the surface of the swelling, the sloughing rapidly spread, diarrhœa then set in ; the abdomen became tympanitic, spots of purpura appearing, at times, over the surface of the body, until the occurrence of passive hemorrhage from the mouth and bowels. The child either died comatose, or exhausted by diarrhœa, in case dissolution was not quickened by the supervention of sudden hemorrhage from some of the large vessels of the neck giving way in sloughing. An attack of convulsions sometimes preceded death, the period of which, unless precipitated by exhausting treatment to which it had been submitted previous to my seeing the child, varied from the seventh to the twenty-eighth day ; the medium time being about the twelfth day from the commencement of the inflammation."* Dr. Graves also relates a case of this kind, and he agrees with Dr. Osbrey that all our efforts should be directed to support the strength of the patient until sloughing takes place and afterwards.

Dr. West observes that "in the majority of instances, however, the glandular swellings which come on after the lapse of a week from the commencement of the disease, though tedious and painful, yet do not endanger life. Occasionally, indeed, death occurs in consequence of the matter formed by the inflammation of the glands, or of the cellular tissue around them, burrowing backwards behind the pharynx, instead of pointing externally. In these cases of retro-pharyngeal abscess, after more or less evident indications of inflammation in the neighbourhood of the parotid or submaxillary glands, accompanied in all probability, with a swelling on one or other side of the jaw, the patient begins to experience difficulty in deglutition, which goes on increasing until the attempt to swallow becomes quite impracticable. As the dysphagia increases, respiration also becomes very difficult, but the dyspnœa continues to increase progressively, and is not aggravated in paroxysms, as in cases of cynanche trachealis, though the effort to swallow will often bring on threatening suffocation. However, there is seldom any modification in the tone of the voice, such as occurs in croup, though the voice becomes by degrees whispering, and then extinct ; while if the throat be examined, the tonsils are observed to be free from swelling ; and sometimes neither they nor the soft palate show the slightest increase in redness, or other token of inflammation." I have already laid before the reader Dr. Fleming's remarks upon the retro-pharyngeal abscess, with the mode of cure, and I must refer him to that chapter for fuller details. A teasing consequence of this affection of the neck has been noticed by Dr. O'Ferrall and Dr. H. Kennedy, viz.: wryneck remaining when the patient was becoming convalescent. Whether it be mechanically owing to the remains of the swelling, or the effect of inflammation upon the muscles, or the

* Graves, Clinical Med., vol. i. p 333.

consequence of disease of the vertebræ, as Dr. O'Ferrall suggests, it is difficult sometimes to decide. The neck is crooked, and any attempt to straighten it gives great pain.

10. *Dropsy.—Albuminuria.*—The dropsy which accompanies or follows scarlatina has been noticed from early times by all authors. It was a subject of special investigation to Plenciz, De Borsieri, Vieusieux, Meglin, &c., and is treated of by Underwood, Dewees, Eberle, Stewart, Condie, Maunsell and Evanson, Coley, West, Barrier, Rilliet and Barthez, Legendre, Johnson, Rush, Toynbee, Simon, &c.

The complication is a very interesting one, and worthy of ample details. M. Legendre thus describes the affection :—"The anasarca which is developed during the desquamation of scarlatina is very different in its mode of invasion, its course, and its symptoms, from that which results from a state of cachexia, or from an obstacle to the course of the blood. In the anasarca consecutive to scarlatina the face is puffed, but tense, elastic, and does not preserve the impression of the finger; the eyelids themselves, which are often so much swollen that their separation is diminished, are resistant. The face does not present that dead paleness which is observable in passive anasarca; on the contrary, from the accompanying febrile action, there is generally a red color in the cheeks. The enlargement of the trunk and members is equally characterized by a remarkable elasticity, so that pressure by the finger leaves no trace, and decubitus on the side does not determine a greater quantity of serum on the side in which the patient lies, nor does the skin assume the paleness and transparency of passive dropsy. From these peculiarities, it is possible that the enlargement might be supposed to result from 'embonpoint' by a person who had never seen the patient before; but this is not possible when the anasarca has lasted some time, and has increased rapidly under the influence of certain serious complications, for then the distension of the subcutaneous cellular tissue becomes considerable, accompanied with paleness and transparency of the skin, and the serum, displaced by pressure of the finger, and obeying the laws of gravity, is accumulated on the side on which ducubitus has taken place. If the eruption of scarlatina has not been very slight, or if much time have not elapsed, the skin will present some traces of desquamation at the moment when the dropsy is developed; if not on the trunk, yet on the feet or palms of the hands. The general symptoms which precede the anasarca commonly diminish after its appearance, leaving merely a degree of fever, which in some infants is perceptible only in the evening. Most frequently, after five or six days these febrile symptoms disappear, either under the influence of treatment, or naturally; but when they are prolonged, and accompanied by new symptoms, either cerebral, pulmonary, or abdominal, there is reason to fear some serious complications in either of these regions. Lastly, the urine presents in this anasarca peculiar characters, which have struck different observers, though in different

ways. Some have mentioned the peculiar aspect of the urine ; others have given their analysis.*

In some cases, the anasarca may be very slight, and yet the attack prove fatal from the effusion of fluid into some of the cavities. In two cases under my care, soon after, a moderate degree of anasarca showed itself, with suppression of urine at first, then bloody, but not albuminous urine, and at the same time cerebral symptoms were developed, heaviness, constant stupor, insensibility, and, in one case, convulsions and death ; the other child recovered. In another case, convulsions occurred after the urine had become natural, and the anasarca had nearly disappeared. The extreme limits of the period at which the dropsy makes its appearance after scarlatina are from ten to forty days. Borsieri, Wells, and others, say between the twentieth and twenty-third day, generally ; Rayer about the fourteenth or fifteenth, or later. It may, however, occur much earlier, even during the eruption. Dr. Osbrey relates a case who died anasarca on the fifth day from the commencement,† and another when it appeared on the second day. It is sometimes preceded by vomiting, diarrhoea, abdominal pains, and fever, but not always ; it may come on quite insidiously and slowly, or with suddenness and rapidity. It ordinarily commences in the face, and from thence extends over the body in the course of two or three days.

Plenciz and Rosenstein were the first to notice that in this form of dropsy the urine was scanty, and resembled the water in which flesh had been washed. Dr. Wells, as the result of his researches, added, that the red color of the urine was owing to a mixture of blood, and that the action of heat determined a floury precipitate, of a dirty brown color, after the separation of which the urine became clear. Different opinions have been maintained in explanation of this condition of the urine, and its connection with the dropsy, and different views held of the condition of the kidneys in this disease. Seymour, Barlow, Spittal, Graves, Lees, and others, regard the renal disturbance in the dropsy of scarlatina as functional, on account of its curability, whereas Bright's disease involves an organic change in the kidneys. Others, however, as Hamilton, Wood, Mateson, Constant, &c., consider the anasarca with coagulable urine as dependent upon Bright's disease of the kidney. M. Rayer regards the continuance of albuminous nephritis as leading to the establishment of one of the three forms of Bright's disease. Lastly, MM. Guersent and Blache, although believing in the existence of acute albuminous nephritis when the urine is coagulable after scarlatina, yet do not consider this nephritis as the cause of the dropsy, because of the great number of cases of dropsy in which the urine is not coagulable. The facts which appear to be certain are these : in some

* *Recherches Anat. path. sur plusieurs Mal. de l'Enfance*, p. 343.

† *Dublin Journal*, vol. xxiii. p. 239.

cases of dropsy with albuminuria, and which proved fatal, the kidneys have been found in a state of hyperæmia, resembling the first stage of Bright's disease, as in instances related by Fischer,* Hamilton,† and others; and Bright, Christison, Guersent and Blache, have found the granulations, so characteristic of albuminous nephritis, in other more chronic cases. But, on the other hand, there are many cases of anasarca, without albuminuria, of albuminous urine without any change in the kidneys, as in Dr. Graves and Dr. Lees' cases, and also of albuminous nephritis without dropsy, as Rilliet and Barthez have remarked, and in some cases which occurred in Dublin, as noticed by Dr. H. Kennedy,‡ and as I have repeatedly seen.

M. Legendre, in his valuable memoir, has minutely reported fourteen cases, and I shall be excused, I am sure, if I give in some detail the result of his observations. As to the *color*, when the anasarca had existed only three or four days, the urine was sometimes blackish, or perhaps only of a red color, more or less deep; after eight or nine days this red color was superseded by a brown color, something like muddy beer; and as time elapsed, and the disease diminished, the urine became of a lighter color, until, about the fifteenth or eighteenth day, it was paler than natural; and when the renal affection had ceased, it became quite natural. These different shades of color depended upon the presence of blood, as was easily ascertained by the microscope. Even after the urine became quite natural, colorless blood-globules could be detected by the same means. At the same time, the urine lost its usual transparency; muddy or troubled when first passed, it became clear after standing, and deposited at the bottom of the vessel either small clots of reddish or brownish flocculi. The specific gravity was slightly diminished; less so than in Bright's disease. When heat was applied, or nitric acid added, there was in all the cases a more or less abundant precipitate of albumen, greater when the urine was blackish or brown, and less in proportion to its light color. This proportion of the coagulum to the blood present in the urine is, according to M. Legendre, a fundamental difference between albuminuria of scarlatina and that in Bright's disease. When the coagulum was deposited, the supernatant fluid assumed its natural color, and the precipitate appeared either of a brown or ash-gray color, and exhibiting under the microscope blood-globules, blanched, but quite recognizable. In certain cases, when death occurred from other diseases, M. Legendre found the kidneys enlarged and less brown than usual; in some parts grayish. Divided lengthwise, it was evident that the increase depended upon swelling or puffiness of the cortical substance,

* Hufeland's Journal, Feb. 1854.

† Edinburgh Medical and Surgical Journal, 1833.

‡ Some Account of the Epidemic of Scarlatina which prevailed in Dublin from 1834 to 1842.

which presented a granular, "sandy or granitic" aspect, which seemed to arise from the glands of Malpighi being less colored than the surrounding parts. The cortical substance was more easily torn than usual, and was somewhat less firm. The tubercular substance was unchanged. As to the nature of the renal affection, M. Legendre considers that, inasmuch as the *post-mortem* appearances are those of congestion, or simple nephritis, and as the coagulation of the urine is explained by the presence of blood, which escapes from the uriniferous canals, we are not justified in assuming the identity of this disease with that of Bright, and that this difference is confirmed by the curability of the one and the incurability of the other. As to the connection between this condition of the kidneys and the scarlatina, he agrees with Guersent and Blache that it is a coincidence, or rather that they are two effects produced by the same cause, viz., the action of cold during the period of desquamation of scarlatina.*

Dr. Graves denies that albuminous urine always results from organic disease of the kidneys: he regards it, as does Dr. Blackhall, as merely an indication of a peculiar inflammatory condition of the whole system, and in this opinion Dr. Lees concurs.

Dr. West has thus described the severe cases of anasarca: "The swelling, after having undergone many apparently causeless fluctuations, becomes extreme as well as universal; the features are disfigured by dropsy; the legs greatly swollen, and the abdominal parietes much infiltrated, while the skin remains hot and dry. The quantity of water voided is very small indeed, and the pain in the back is often very severe. The chief suffering, however, is referred to the chest; the respiration is labored and accelerated, and the child is frequently unable to resume the recumbent posture, and is, moreover, distressed by a frequent short and hacking cough. Under these circumstances life is sometimes prolonged for several days, though in a state of extreme suffering, remedies proving unable either to increase the action of the kidneys or to relieve the dropsy. Death is sometimes preceded by a sudden aggravation of the signs of disorder of the respiratory organs, which assume all the painful characteristics of œdema of the lungs; and in other cases a comatose condition comes on, such as often precedes death from Bright's disease in the adult. Sometimes a temporary improvement takes place, the anasarca abates, and the kidneys resume their functions; but the patient dies not long afterwards, from the effects of pleurisy or pericarditis, which had come on almost unnoticed during the acute stage of the affection." Dr. West does not state exactly what he considers to be the connection of the albuminous nephritis with the anasarca, but he has described what he believes to be the pathological stages of the former: "The microscope

* Recherches, &c., sur quelques Mal. de l'Enfance, p. 316.

has shown us that the morbid process begins in the cortical parts of the inflamed kidney, the urinary tubules of which are stimulated to an increased production of their epithelial lining, or even to a pouring out of solid fibrous matter into their cavities. The urine carries away with it some of these matters, and thus frees the tubules for a time; but as these contents are reproduced in quantities too large to be thus eliminated, some of the tubules become plugged and impervious, sometimes even so over-distended that they give way and are completely destroyed. Nor is this all, but the capillaries of the organ necessarily bear a part in the mischief. At first, from over-congestion, they become dilated and varicose, and afterwards (in part probably, from the formation of the fibrinous clots within them, in part as the result of a process of adhesive inflammation) they become obstructed and even obliterated. Supposing this morbid process to have gone on to any considerable extent, the kidney must be left by it permanently and irreparably injured, while, even in its slighter degree, it must for a time seriously disturb the functions of the organ. In the earlier stages of the disease, the presence of albumen in the urine is in part due to the actual escape of blood from the overloaded capillaries of the kidney, and in part to the temporary suspension of its functions. If, at a later period, when the urine has lost its preternaturally deep color, and has regained much of its healthy appearance, albumen should still exist in any quantity, there will be reason for apprehending that some abiding injury has been inflicted on the organ.”*

Dr. Copland, in an admirable article, has gone fully into the consideration of the affections of the kidneys in scarlatina. He believes that they are frequently affected in the early stage of the disease, when we find more or less œdema or anasarca, or dark-coloured eruptions; the urine scanty and high-colored, muddy, brown, or red, from blood mixed with it; and further, from the interruption of the functions of the kidneys in the elimination of the excrementitious and unassimilated materials in the blood, the mortality in the early stages is probably owing to the renal complications: “For I have remarked,” he says, “in many instances, as respects both the symptoms during life and the appearance of the kidneys after death, sufficient evidence to convince me that these organs are remarkably congested, and their secreting and tubular surfaces are the seats of a similar vascular injection or efflorescence to that existing in the vascular rete of the skin; and that this efflorescence on the surface of the uriniferous tubes, &c., and the associated swelling and congestion of these organs during the early stages of the malady, either impede or interrupt, or altogether suppress the function of urinary excretion, and thereby occasion an accumulation of excrementitial and contaminating materials in the blood, and consecutively an increase of the poisonous action of the infected blood upon

* Diseases of Infancy and Childhood, p. 422.

the nervous system, and on vital organs and parts, thereby producing further complications, &c.”* Dr. Copland subsequently notices the affection of the kidneys and dropsy, as occurring after scarlatina. The latter he considers as being chiefly caused by the former, although the state of the skin may assist; and he alone seems to have noticed what I have no doubt is the case, that certain other sequelæ of scarlatina are the result of this condition of the kidneys, and of the imperfect performance of their functions, as, for example, effusion into the ventricles of the brain, into the cavities of the chest, diffuse inflammation, anæmia, and its consequences, &c. Thus, then, we find, 1, scanty urine, loaded with lithates and varying in color; 2, very often containing blood, which gives it a color of rusty iron or porter brown; 3, containing albumen, which does not depend upon the existence of Bright’s disease in the kidney, but upon a high degree of general congestion with inflammation of the tubes; and 4, containing epithelial casts or *debris* of the same, thrown off from the tubes, constituting a true desquamative nephritis, as Dr. George Johnson has termed it. More recently Dr. George Johnson has minutely described this affection, which he terms “acute desquamative nephritis;” and I would strongly recommend a perusal of this section of his valuable work.†

In addition to effusion into the serous cavities, M. Legendre has investigated, with his usual acuteness and care, a consequence of the anasarca which has been very much overlooked—I mean *œdema of the lungs*. This he believes to be dropsy of the interstitial cellular membrane of these organs, and not vesicular œdema; for whereas in the latter, the lungs are of a grayish rose color, contain air, crepitate, and float in water; in the former, they are of a lilac color, entirely without air, and neither crepitate nor float in water. The disease is seldom recognised during life unless extensive, but then it gives rise to characteristic symptoms, sometimes commencing by cough and some oppression in breathing when it precedes general anasarca; after this occurrence the cough and dyspnœa increase greatly, and threaten suffocation. When œdema of the lung and general anasarca set in together, the child is suddenly attacked by cough and dyspnœa, so that it cannot lie down. There may be fever, agitation, and gastric disturbance. Generally speaking, there is heard a subcrepitating râle, without dullness, except towards the lower part of the chest, but the signs are not in proportion to the extent of the mischief. The action of the heart is energetic, but the pulse weak and quick, from 120 to 160, whilst the respirations amount to 50, 80, or even 100 per minute. Dr. Lees alludes to this complication as causing the oppression of breathing in one of his patients.‡ He believes that the fluid may be effused

* Dict. of Pract. Med., part xiv. p. 673.

† Diseases of the Kidney, p. 84.

‡ Dub. Journal, vol. xxiii. p. 232.

either into the cellular substance of the lungs or into the cavity of the thorax. This is a much more dangerous form of disease than the vesicular œdema, both from the impediment which it offers to aeration of the blood, and from its occurrence at a time when the child is weakened, and is embarrassed by general anasarca. The antiphlogistic treatment, so useful for the general dropsy, appears equally successful in removing œdema of the lungs.

Now let us see to what our information amounts. We find that in some cases, in the early stage, anasarca occurs, and that in these cases, and in others where there is no anasarca, the urine is scanty, discolored, albuminous, and contains blood-globules; in other cases, at a more advanced period, more extensive and general dropsy occurs, accompanied with a certain train of symptoms, and that in these also the urine is albuminous and contains red globules; that this change in the urine is owing to congestion or inflammation of the kidney, and seems in some way connected with the dropsy, either as cause and effect, or as a consequence of the same cause; that the effect of this condition of the kidney upon the blood is to deprive it of red globules, to arrest the excretion of excrementitious matters and of miasmatic impurities, and, as a consequence, to induce certain other complications,* and to leave the patient exposed to the effects of impure blood, or blood with the natural and healthy proportions of its constituent parts destroyed. I think we possess sufficient evidence to prove the existence of congestion or inflammation of the kidneys, but not enough to lead to the inference that the albuminuria accompanying scarlatinous anasarca is owing to Bright's disease, nor that this state of the kidney is liable to degenerate into Bright's disease. There are only two instances of which I am aware in which abscess was the result of scarlatinous nephritis; both are contained in a paper by Dr. Rose Cormack.†

11. *Ophthalmia*.—Mild attacks of ophthalmia not unfrequently occur during convalescence from scarlatina, but in general they give but little trouble, unless the child should be of a scrofulous constitution or much worn down. Occasionally, however, the attack is much more severe, and may end in sloughing of the cornea, as in the case related by Dr. Osbrey, in which, simultaneously with the gangrene of the neck, sloughs formed on both corneas, and rapidly extended, involving all the other textures of the eyes.‡ Dr. Gregory also alludes to similar cases;§ and one such occurred in my own practice.

12. *Otitis*.—Inflammation of the ear may occur as an extension of

* On the Dropsy following Scarlet Fever, by Dr. Scott Alison, Lond. Jour. of Med., No. iii. p. 227.

† London Jour. of Med., No. v. p. 454.

‡ Graves's Clinical Med., vol. i. p. 334.

§ On Eruptive Fever, p. 128.

the disease of the throat, and may run on into ulceration, involving ultimately the destruction of the small bones of the organ; inflammation, ulceration, and perforation of the tympanum; chronic otitis, with offensive discharge; inflammation and ulceration of the membrane lining the cochlea and semicircular canals; caries of the petrous portion or mastoid process, or other parts of the temporal bone; and even the extension of inflammation, suppuration, or ulceration to the membranes and substance of the brain may supervene; and, as respects these latter changes especially, not unfrequently at remote periods from the primary affection of the throat, and extension of lesion to the internal ear. When disease of the ear is so far advanced as to implicate the bone in which the organ is lodged, the consequences are serious, not only as respects the organ itself, but also as regards adjoining vital parts, the affection of which often occasions great and protracted suffering, and ultimately fatal results. Otorrhœa is stated to be frequent, but of no importance, by Heyfelder; it is even regarded as favorable by Berndt, when the nervous system is much affected. Guersent and Blache have rarely met with it.

13. *Hemorrhages*.—In addition to blood discharged from the kidneys, we occasionally meet with epistaxis occurring in the inflammatory stage or towards the end, in cases of scarlatina maligna. Bleeding from the throat has also been noticed. Dr. Fothergill mentions that hemorrhage from the nose or mouth has sometimes carried off the patient, and a similar result has occurred from bleeding from the ear.* Dr. Graves mentions a case of Mr. Porter's in which hemorrhage from the ear proved fatal, and another fatal result from epistaxis. Drs. Hunt and Chas. Johnson met with a case of fatal hemorrhage from an ulcer of the throat. Drs. Osbrey and Kennedy cite fatal hemorrhage from the vessels destroyed by the sloughing of the neck.

14. *Vaginal Discharges*.—At the decline of the eruption of scarlatina, girls are occasionally, though rarely, liable to vaginal discharge. Papers on this subject have been published by Dr. Barnes,† and Dr. Rose Cormack,‡ but in Dr. Miller's work on scarlatina, he mentions that he considers it very rare, as he has not observed it. Dr. Cormack, however, frequently met with it in the epidemic of 1848-49. It is a simple and very manageable affection; its only importance being the question that may be raised as to its being blennorrhagic; those who know how common similar vaginal discharges are among young children will hesitate before attributing this character to it. Fomentations with hot water, a little black wash, or in obstinate cases, a weak solution of nitrate of silver will be sufficient for the cure if convalescence progress favorably.

* Works, vol. i. p. 376.

† London Med. Gaz., July 12, 1850.

‡ Ibid., Aug. 2.

15. I think I have noticed at sufficient length all the principal complications of scarlatina. There are undoubtedly other sequelæ which occasionally occur, as Eberle remarks: "At times the disease gives rise to various nervous affections, such as hysteria, spasmodic asthma, chorea, epilepsy, and neuralgic pains in the extremities; and occasionally it has been followed by strumous disorders, chronic cutaneous eruptions, herpes, gutta serena, and rheumatic pains."* Small ulcers about the nose and at the corners of the mouth, purulent discharges from the nostrils, tenderness of the skin, severe pains in the limbs, arthritis, and erythematous eruptions are by no means uncommon. In the epidemic described by Dr. Kennedy, purulent effusion into the joints was a frequent sequela. One or more joints were attacked and filled with pus; the synovial membrane being sometimes healthy, sometimes inflamed, coated with lymph, and the cartilages ulcerated. In other cases the swelling was caused by lymph effused round the joints.† Prof. R. Smith has brought similar cases before the Pathological Society, and recently I have met with two cases of the kind. Dr. Armstrong has noticed that the hair is very apt to fall out after scarlatina, and to be very imperfectly reproduced. Dr. Huxham mentions "excoriation of the anus and buttocks;" and Dr. Graves relates a case in which aphthous ulceration of the anus occurred.‡

Pathology.—The appearance found after death, dependent upon scarlatina, but not resulting from the complications, are neither many nor of great magnitude. The eruption, if previously faint, may have disappeared from the surface of the body, or it may remain in patches of a livid hue, and, on dividing the skin, the vascular net work is found unusually injected.

The redness of the mouth, tonsils, and pharynx disappears when the attack has been slight, or when fatal in the early stage; but in severe cases the mucous membrane may be found softened, ulcerated, or gangrenous. The digestive mucous membrane is softened in the malignant cases. Brunner's and Peyer's glands are enlarged, and occasionally the mesenteric glands.

Congestion of the brain, or its membranes, of the liver, of the spleen, and of the kidneys, is by no means unusual, according to Rilliet and Barthez.

Each complication will, of course, furnish its peculiar morbid lesion, but it would be a waste of time to repeat them here. There are two or three points, however, on which it is desirable to add a few words. Rilliet and Barthez consider the essential element of the disease—the *point du depart*—to be the *condition of the blood*; and

* Diseases of Children, p. 454.

† On Scarlatina, p. 22.

‡ Clin. Med., vol. i. p. 341.

they describe it as varying in its state, sometimes being liquid and unusually fluid, black, or serous, and clear, with few clots, and those soft and easily crushed; in other cases the coagula were abundant, firm, solid, and in part fibrinous. Sometimes it was effused profusely into the tissues, in other cases the congestion was normal. Occasionally certain organs were pale, and contained little blood. Andral, Gavarret, and Lecanu analyzed the blood of persons in scarlatina, but the result did not differ much from that of healthy individuals. Dr. Copland speaks of the blood in the malignant form of the disease being in the same state as in other malignant fevers.

Again, as the changes in the urine are so important in their practical bearing, I will just repeat the principal ones. During the early stages of the disease it is always scanty, high-colored, and sometimes of a deep red hue. In the mild and inflammatory forms, it has generally an acid reaction, but in the asthenic or malignant scarlatina it is either neutral or alkaline, and very turbid, sometimes albuminous and containing blood globules. In most cases, even early in the disease, it rapidly becomes ammoniacal; and in the malignant cases it deposits a viscid, whitish sediment, consisting of the earthy phosphates and mucus, and containing urate of ammonia and uric acid. During the process of desquamation the condition of the urine is a matter of dispute; some have found the albuminuria with dropsical symptoms or without, or dropsy with albuminuria. Solon found albumen in the urine of twenty-two out of twenty-three cases of scarlatina; but Philippi, of Berlin, observed at least sixty cases in which there was no albumen. It is probable that in very mild cases there is little or no albumen, but when fever is excited at this period, and anasarca supervenes, the urine generally becomes albuminous; and when this occurs, we may expect that certain organic complications, to which I before alluded, will take place. When during its early stage scarlatina is complicated with cerebral, pulmonary, or abdominal disease, the urine may either be suppressed altogether, or scanty, high-colored, bloody, and albuminous. As regards the actual condition of the kidneys in the nephritis consequent upon scarlatina, in addition to the notice I have already given I may quote the description of Dr. G. Johnson: "The kidney," he says, "in these cases, is enlarged apparently by the deposit of a white material in the cortical substance; the vessels in the cortical portion, where they are not compressed by this new material, are injected, and of a bright red hue; the medullary cones are of a dark red color, in consequence of the large red veins which occupy these portions of the gland being distended with blood. The appearance of the entire organ is quite that of a part in a state of acute inflammation. When the kidney has been in a softened condition before the occurrence of the inflammatory disease, as often happens in elderly persons, the lobules on the surface appear larger and coarser than natural; the veins, being less compressed than when the natural texture of the kidney is firmer and more unyielding, are

much distended with blood, so that the entire organ is of a dark slate color. On a microscopical examination the convoluted tubes are seen filled, in different degrees, with nucleated cells, differing in no essential character from those which line the tubes of the healthy gland. The Malpighian bodies are for the most part transparent and healthy, but the vessels of the tuft are sometimes rendered opaque by an accumulation of small cells on their surface. Some of the tubes contain blood, which has doubtless escaped from the gorged Malpighian vessels. There is no deposit exterior to the tubes.”*

As scarlatina may occur in the course of other diseases, it becomes a matter of practical importance to ascertain what effect is thus produced upon the primary affection. Any affection of the mucous membrane of the mouth, pharynx, or digestive system, but especially the former, appears much aggravated by the incursion of scarlatina, which is what we might perhaps have anticipated. Trifling disorders become serious, and death may be the consequence. On the contrary, pulmonary inflammation seems rather benefitted than injured. Rilliet and Barthez state that they have many times seen scarlatina supervene upon pneumonia, and that, unlike measles, it never exasperated the pulmonary disease; nay, in one case a slight pneumonia appeared to be cured by the eruptive fever alone. Hooping-cough may be cut short, and chorea disappear, on the appearance of scarlatina. As to the influence of scarlatina upon tubercles, Rilliet and Barthez give the following conclusions as the result of their experience: “1. That scarlatina rarely gives rise to tubercles. 2. That tuberculous children rarely take scarlatina, and when they do it is anomalous. 3. Children cured of tubercles are more liable to scarlatina than the preceding, and the eruption may be normal. 4. Those tuberculous children who do take scarlatina have but few crude tubercles, and very rarely any that are softened. 5. In these cases, the tubercles have a tendency to become cretaceous in a short time.”

Causes.—Among the predisposing causes, we may mention *age*, children being more frequently subjects of the disease than adults, and adults than old people. I have already stated that I do not believe that children are more liable, but that they are exposed to the infection *whilst children*, and therefore take the disease before they grow up. Infants at the breast often escape the disease, although other members of the family may be suffering from it, probably because they are kept more apart from the room where the infection exists; and we occasionally see a child enjoying a perfect immunity, even though associating with those affected. The *fœtus in utero* may have the disease. Cases of this kind are collected by Grætzner; and Dr. Gregory mentions that a child of his own was born with it.

Sex appears to exert no influence, males and females being equally

* Cyclop. of Anatomy and Physiology, art. Ren.

liable. In London, 1838, 747 males and 777 females died of it; in 1839, 1241 males and 1258 females; and throughout England and Wales, in 1840, 8927 males and 8935 females. Of 158 fatal cases, in 1839, in New York, 86 were males and 72 females; and of 391, in 1840, 208 were males. Reid, Richter, and Steiglitz, however, believe that females are more liable to it than males.

Scarlatina seems to be more prevalent in temperate climates; and it is more severe and propagated more extensively in warm, humid weather, and in low, marshy districts, and in the crowded, dirty, ill-ventilated portions of cities. Dr. Gregory mentions that Dr. Jackson could not recollect any cases deserving the name of scarlatina in India. Dr. Copland never met with a case between the tropics. It was introduced into North America in 1735, and its progress was slow but fatal. It is as yet, I believe, unknown in New Zealand, as it was until lately in Australia. In the year 1848, however, it prevailed at Sydney, as I am informed by Dr. Silver, late military and colonial medical officer, now of Gala, County Galway; and Mr. Gryles informs me that cases occurred before this time. He is not aware of any other part of that continent having been visited by the disease.

The principal modes of its communication are contagion or infection, and by the occurrence of an epidemic of the disease.

Although the contagious nature of scarlatina has been doubted by Dewees, Daehere, Reich, Tortual, and others, yet so many and such conclusive facts daily occur that few of the present day hold this opinion; and whatever doubt did exist must have been removed by the experiments of Sir B. Harwood, who succeeded in producing the disease by inoculation with the fluid from the vesicles which were intermingled with the eruption of scarlatina, although he was disappointed in producing a milder disease. Dr. Copland met with a case in which the disease was excited by the contact of a small quantity of the discharge from the throat of a person affected with the malignant anginous scarlatina. M. Miquel de l'Amboise succeeded in inoculation by means of the blood of a patient in scarlatina. The poison of scarlatina, by which it is ordinarily communicated, consists in some miasma, of whose nature we are ignorant, either preserved and perpetuated by individual cases, or by fomites, or formed, *de novo*, at different epochs. That it does emanate from persons laboring under the disease, and that the atmosphere of certain localities may become so impregnated with it as to communicate the disease to individuals visiting such places, we have sufficient proof; but it is very difficult to say whether the disease may originate spontaneously by any combination of predisposing causes. The best writers think not, and it seems to me unlikely. The media by which the disease is transmitted, in addition to personal contact, are the atmosphere surrounding the sick, or substances impregnated with the miasma from the sick. The distance to which infection may be carried, and the duration of the infecting power possessed by the fomites, is very uncertain, and will be

much modified by the freedom of access or exposure to pure air. Infection, as Dr. Sims has observed, may remain in a house some weeks, and it certainly may be transmitted in clothes to a considerable distance.

But an important question arises—granted that a person visiting a locality where it has prevailed, or using clothes of a patient, may take it, can a third person not having the disease carry it from a person who has it to others who have not? I should not like to speak positively, but during the late epidemic in Dublin, I saw one instance which it seemed difficult to explain in any other way. Cazenave considers that the greatest activity of the contagion is during the desquamation.

But the extent and desolating fatality are more striking when we contemplate its spread as an epidemic. Many such are on record, indeed they are so frequent that it would be impossible to attempt an accurate enumeration of them. I may, however, mention some of the principal. An epidemic angina, with scarlet eruption, raged in Spain in 1610, from whence it passed to Naples in 1618. Laurent mentions an epidemic in Germany in 1625, and Sydenham one in London in 1670 and 1675. Morton described that in London in 1689, and Sir Robert Sibald that in Edinburgh in 1680. It prevailed in Saxony in 1695. An epidemic, which Mr. Wilde thinks was scarlatina, is mentioned by Dr. Rutty as prevailing in different parts of Ireland in 1743, 1744, and again in 1758, 1759, 1762, 1798, 1799, and 1800. It first appeared in Boston, U. S., in 1735–36; it is stated that 4,000 were attacked, and one in 35 died. In Baltimore it was epidemic in 1747–48. Dr. Fothergill has given us the history of the London epidemic of 1747, 1748. It prevailed at La Haye in 1748, 1749; at Upsal in 1741 (Rosen); in Champagne in 1751; at Vienna in 1759 (Stark), and 1770, 1771, (De Haen, Kirchvogel); in the city of Cephalonia in 1763 (Zulatti); at Essen in 1763 (Franck); at Harcourt in 1744 (La Pecq de la Cloture); at Heidelberg in 1775 (Zimmermann); at Copenhagen 1777, and Spain in 1786; at Jersey and in New England 1784; at St. Christopher's, West Indies, in 1787 (Stephens); at Langres in 1800; in Dublin in 1801, 1802, 1803, 1804, 1807; and at Caithness, in Scotland, and near Brignoles, in France, in 1807; at Marseilles in 1821, 1822; in Dublin from 1832 to 1834 (Graves); in Virginia, United States, in 1832; in England in 1838, 1839, 1840 (Gregory); in Dublin in 1840 (Lees); and in Philadelphia in 1841, 1842 (Meigs). Dr. Graves states that it has raged every winter and spring, with undiminished violence, in Ireland, from 1835 to 1846, resisting every kind of treatment, but that in 1847, 1848, it had become milder and less frequent. During the years 1841, 1842, Meigs states that it prevailed very extensively, and was very fatal in Philadelphia.*

* Diseases of Children, p. 448.

In the year 1842 it occurred at Market Hill, an account of which has been given by Dr. Lynn.*

Diagnosis.—The characteristic symptoms of scarlatina are, violent preliminary fever, with sore throat, followed by the appearance of a general rash of an intensely red color, not elevated, and with disturbance of the renal functions.

1. It may be distinguished from *ulcerated sore throat*, by the occurrence of the rash, but when that is absent, as in *scarlatina sine exanthemate*, the distinction will be very difficult, if not impossible, unless scarlatina have attacked other members of the same family.

2. From *measles* by the greater intensity and shorter duration of the initiatory fever, the sore throat, the absence of catarrhal symptoms, and the general equable appearance of the rash, instead of the semicircular or crescentic form and elevated surface of the eruption of measles. The presence of albumen and blood in the urine, and the occurrence of dropsy at a more advanced period, will be an additional evidence that the disease is scarlatina.

3. From *roseola*. The eruption in this disease is sometimes an admirable imitation of scarlatina, but in general there is much less fever, no sore throat, and the disease lasts a much shorter time.

4. From *miliary fever*. In this disease there is an eruption of small, hard vesicles, containing clear water, as though water had been sprinkled in very minute drops, resembling in appearance and touch the drops on an ice plant, sometimes on a flushed surface, but there are few, if any, catarrhal symptoms, no sore throat, and subsequently no desquamation. In scarlatina the florid redness is general and equable, and if any miliary vesicles are seen they are comparatively few; and the sore throat, intense fever, disordered urine and desquamation, will sufficiently prove the nature of the disease.

5. But suppose the patient has the disease very lightly, the eruption fainter than usual, and no sore throat: in such cases it is often impossible at once to say whether the disease be scarlatina or not. There are three circumstances, however, any one of which may clear away all doubt; 1st, the desquamation of the cuticle in large flakes, which is so unlike the small, scaly or powdery desquamation of measles; 2nd, other children of the same family catching the disease, and exhibiting its peculiar characteristics; and 3rd, the occurrence of the distinctive sequelæ, anasarca with albuminous urine, &c.

Prognosis.—As a general rule, scarlatina is a more serious malady with children in proportion as they are young; infants under two years suffering more from it than after that age.

But in mild cases there is little danger, if care be taken that the child do not take cold during the latter stages and convalescence.

* Appendix to Dr. H. Kennedy's work on Scarlatina.

In scarlatina anginosa, when the inflammatory symptoms run high, when the throat is much affected, when internal organs are attacked, or when nephritis exists, the disease often proves very fatal.

Scarlatina maligna is as fatal a disease as any to which children are liable; the typhoid character of the fever, the disposition of the sore throat to become gangrenous, the internal inflammations, and the renal complications, render it extremely difficult to treat the case satisfactorily.

The occurrence of an epidemic, and its peculiar character, must be taken into consideration in forming our prognosis. I have already shown the fearful increase of mortality in London in certain epidemics. They sweep down whole families occasionally, and during their prevalence, even cases that commence mildly are by no means to be regarded as safe. The mortality has varied from 1 in 6 to 1 in 40, according to the character of the epidemic.

Treatment.—As a preliminary to the successful treatment of scarlatina, as of other epidemic diseases, the physician ought to be fully acquainted with the prevailing atmospheric constitution of disease, and with the type of the peculiar epidemic, as this knowledge alone will often determine, beforehand, whether antiphlogistics or stimulants, whether depletives, or tonics, are to be employed. That the importance of this may be more fully understood, I would recommend strongly, the perusal of Dr. Graves' 22nd Lecture "on scarlatina," which is worthy of the pen of that distinguished physician. Moreover, it will be necessary also to understand the constitutional peculiarities of the patients. I have seen cases, and so I am sure have others, in which it was necessary to use stimulants very freely from the beginning, and throughout the disease. I have a strong notion that Dr. Stokes' observations on the condition of the heart in typhus fever as an indication for wine, apply also to the typhoid form of scarlatina.

1. Mild cases of scarlatina, when the fever is slight, the sore throat trifling and the eruption favorable, require but little treatment beyond a dose of aperient medicine, a demulcent gargle, and a cool, well ventilated apartment.

If there be much fever, the pulse quick, skin hot, urine scanty, with pain in the back and limbs, an emetic will afford great relief, and its action should be promoted by diluent drinks, and subsequently by diaphoretics.

When the head is much affected in the preliminary stage, Dr. Armstrong recommends the warm bath, strongly impregnated with salt, followed by a brisk purgative.

The bowels must be kept free, and the surface not too much heated by bedclothes.

2. *Scarlatina anginosa* will require a more active treatment. In the more sthenic form we should commence with an emetic, nor will this be less beneficial if vomiting should have occurred; if there be pains in the back and scarcity of urine. If the pulse be full and quick,

and there be much cerebral excitement, or pain in the region of the kidney, with scanty and high-colored urine, it will be advisable to take some blood by cupping or leeches from the nape of the neck, behind the ears, or from the loins. Drs. Macintosh, Armstrong, and others, recommend general blood-letting in the early stage, and speak most highly of its beneficial effects in reducing the fever; but the more general opinion, in which I fully agree, is, that it is not ordinarily necessary, that it requires great discrimination in its use, and that it is mainly beneficial in cases where there is high fever, a full pulse, and a disposition to inflammation of some internal organ. In some epidemics it is borne very well, in others its effects are very pernicious. Whether cupping be necessary or not, the sore throat will be benefitted by the use of a stimulating liniment, but we must take care that the skin be not too much irritated. Blisters are rarely, if ever advisable, on account of their disposition, in scarlatina, to run on into severe ulceration. Or the throat may be carefully fomented, or a poultice applied externally, and the steam of hot water inhaled. Cooling gargles, if the child be old enough to use them, will be found very soothing. They may be made of infusion of roses or cinchona, red wine and water, camphor, or rose-water with nitrate of potass, &c.

After the vomiting has ceased, a few grains of calomel may be placed on the child's tongue, to be followed in an hour by some gentle purgative of rhubarb and magnesia, infusion of roses, or senna, with manna and salts, or castor oil, &c., so as to evacuate the bowels completely. Saline, diaphoretic, or diuretic mixtures may then be given, in a state of effervescence or not, as the patient pleases, although Dr. Bateman doubts the success of the former, unless the heat of the skin have been previously reduced. Richter recommends the muriate of ammonia, and Steiglitz dilute sulphuric acid.

When the heat of the skin is great, Dr. Currie and others advise cold affusion, but it would seem that it has been too indiscriminately used, and disappointed expectation. It is not without danger, except in the more sthenic cases, as it rather favors internal complications. Dr. Bateman observes: "We are possessed of no physical agent, so far as my experience has taught me (not excepting even the use of blood-letting in inflammation), by which the functions of the animal economy are controlled with so much certainty, safety, and promptitude, as the application of cold water to the skin under the augmented heat of scarlatina and of some other fevers. I have had the satisfaction, in numerous instances, of witnessing the immediate improvement of the symptoms, and the rapid change in the countenance of the patient, produced by washing the skin. Invariably, in the course of a few minutes, the pulse has been diminished in frequency, the thirst has abated, the tongue has become moist, a general free perspiration has broken forth, the skin has become soft and cool, and the eyes have brightened; and these indications of relief have been followed by a calm

and refreshing sleep.”* Dr. Armstrong speaks highly of tepid affusion four or five times in twenty-four hours, in the mildest form, and of cold affusion during the first three days, in scarlatina anginosa. Dr. Copland derived so little benefit from affusion that he prefers a tepid bath, or cold or tepid sponging of the surface. Dr. Dewees thinks the sponging as effectual and safer than affusion.

Some modification is necessary in the asthenic form of anginose scarlatina. General bloodletting is out of the question, and even local cupping or leeching seems to do more mischief, by weakening and depressing the patient, than good. We should commence with an emetic, followed by purgatives and diaphoretics, and have recourse to stimulating liniments to the neck and loins, if necessary.

So far I have supposed the case to be uncomplicated, and these means, wisely used, may succeed in preventing complications in many cases. In others they will fail, or some complication may have occurred before we were called to the patient, and our duty will be to treat each complication according to the rules laid down for the disease, bearing in mind the distinctive individual or epidemic character of the scarlatina, and modifying our treatment accordingly. Leeches to the part affected, fomentations, embrocations, poultices, &c., may be used generally with benefit.

3. In *scarlatina maligna* our treatment must vary; moreover it must be very prompt, or we may lose our patient, on account of the rapidity of the disease.

When it commences with high fever, full, quick pulse, Dr. Armstrong advises cold affusion, and if that fail in reducing the heat, he recommends bleeding. This, however, will rarely be necessary or justifiable. Even local bloodletting, which seems called for by the symptoms, is rarely of any use, and may be injurious, either for weakening the patient, or from diffuse inflammation attacking the leech-bites, and spreading to the neighboring parts. An emetic may be given immediately, with an ample supply of diluents, and a mercurial purgative; and the liniment, or a turpentine embrocation applied to the neck or loins, or both.

But more than this must be attempted. The decoction of cinchona should be given every three or four hours, with the carbonates of soda, potash, or ammonia, either in a state of effervescence, the alkali being in excess, or with the alkaline carbonate only. If the acid be omitted, the fixed and volatile alkalies may be given at the same time, with the spiritus ætheris nitr., and tincture of serpentaria. “It is often difficult,” Dr. Copland observes, “to determine whether or not the decoction should be given with an acid or an alkali, in the more malignant states of scarlatina. The choice should depend, in some measure, on the state of the urine. If this secretion be not suppressed,

* On Cutaneous Diseases, p. 81.

and if it be alkaline, and contain phosphates, the cinchona should be conjoined with hydrochloric acid and hydrochloric ether; or the sulphate of quina may be given in the infusion of roses, with dilute sulphuric acid and sulphuric ether, or the compound spirits of ether. When, however, the urine is suppressed, or nearly so, and when it presents an acid reaction, or is albuminous or bloody, after having recourse to emetics and terebinthinate epithems over the loins, I have generally preferred a combination of the decoction of cinchona, with the liquor ammoniæ acetatis, or carbonate of ammonia, or with either of the alkalies, in a state of effervescence with a vegetable acid.* At the same time, bark should not be given without discrimination. Dr. Armstrong regards stimulating and tonic remedies as "pernicious in the first stage, and most destructive in the second;" and so they may be, if inflammatory symptoms run high; but after these have been subdued, and the disease shows itself in its true form, then assuredly tonics are beneficial. Dr. Garrett formerly recommended the chlorate of potass, and Dr. Clutton the hydrochloric ether, with or without decoction of bark, in malignant scarlatina. Dr. Peat and Dr. Stewart speak most highly of the sesquicarbonate of ammonia, as a stimulant, in doses of from two to four grains, in an emulsion with mucilage, for children from four to seven years of age. Infusion of serpentaria is useful from its being both a stimulant and a diaphoretic. Capsicum was recommended by Dr. Stevens as a powerful stimulant, and experience proves it to be of great value. He tried it in about four hundred cases with great success. Chlorine and the chlorides have been strongly recommended in the severe cases. Powdered carbon alone, or in combination with quinine, cascarilla, or cinnamon, with the addition of camphor, creasote, and capsicum, have been beneficially employed by Dr. Copland. The flowers of arnica are recommended by Malfatte and Steiglitz. Reil speaks highly of large doses of musk when there is much restlessness and nervous irritation. Dr. Schneemann, of Hanover, has strongly recommended the inunction, morning and evening, of the outer surface (except the face and scalp) with fat of bacon, so that the body is to be coated with fat. This may be done at the commencement of the eruption and continued until desquamation is complete. Various are the good effects said to result; the prevention of cold, relief of the itching and brittleness of the skin, promotion of its functions, and of the oxidation of the blood; preventing infection and diminishing infection, &c. Of course this does not supersede more active treatment if necessary.

The local applications to the throat are of various kinds. Externally the liniment or the turpentine should be applied, as in the former variety, and internally, if the child be old enough to gargle, it may use a gargle of alum and water, port wine and water, chloride of lime

* Dict. of Pract. Med., part xiv. p. 693.

and water, decoction of bark, with nitric acid, and infusion of cayenne. Dr. Willan recommends fumigation with nitrous acid gas. Dr. Jackson applies iced water, or ice in a muslin bag, to the back part of the mouth. Dr. Eberle has found benefit from an infusion of the indigo plant, and from black wash. If not able to use a gargle, it must be applied with a sponge, or a dossil of lint on the end of a rod, three or four times a-day. If the ulceration of the throat assume a grave character, we must have recourse to stronger caustics, and after cleansing the parts, apply nitric acid or nitrate of silver freely, so as to check its progress by changing its character, as I recommended when speaking of putrid sore throat.

The bowels must be kept moderately free, and it seems generally agreed that calomel acts most beneficially in this way; it may be aided by castor oil, rhubarb, jalap, or saline mixture. It will be necessary to be careful in giving purgatives during the collapse, as it may thereby be increased. Cool drinks should be permitted. Cold water, iced water, or water acidulated with lemon-juice, dilute sulphuric or muriatic acids, is exceedingly grateful and refreshing. In addition to the tonic and antiseptic remedies already mentioned, it will be necessary, in many cases, to give wine or brandy freely, and such nutriment, by broth, beef-tea, &c., as the patient can take.

The treatment I have thus shortly sketched will generally be sufficient for each variety, but it must be modified according to the constitution of the child, the character of the epidemic, and any complication that may exist.

Of the suitable treatment of the latter I have already spoken in the chapters treating of those diseases, to which I must refer the reader, but on the treatment of the *renal affection* I must say a few words here. Something may be done in the way of prevention during the period of desquamation, by carefully avoiding cold, prohibiting the too free use of animal food and stimulating beverages, and by promoting the healthy action of the skin by warm clothing, warm baths, &c.

But when the disorder actually exists, antiphlogistic remedies and diet must be adopted, unless the strength of the child be much reduced, or the type of the scarlatina be typhoid. Bleeding, cupping the loins, or a few leeches, will generally afford relief, and it may be repeated if necessary, and if the child can bear it. If the weakness be too great, we must content ourselves with applying counter-irritation to the loins, if the scarlatina have subsided, by means of mustard poultices, or compound camphor liniment. Dr. George Johnson objects to blisters because of the action upon the kidneys, but I have seen them useful. A warm bath should be used frequently.

Internally, diaphoretics should be administered and gentle purgatives. Dr. West speaks highly of tartar emetic, in nauseating doses, given every three or four hours, combined with a solution of the acetate of ammonia; and afterwards mild diuretics, as the acetate of potash, extract of taraxacum, spirits of nitrous ether, &c. I quite agree in

this opinion of the value of tartar emetic, especially at the beginning of the attack, but I think Dr. G. Johnson is right in his objections to diuretics. I have seen the amount of blood in the urine checked by the use of gallic acid in doses of one-third or one-half of a grain three times a-day. The disappearance of the blood and albumen, and the resumption of its healthy color by the urine, will be the best evidence of the diminution of the renal disease.

Fortunately the treatment I have advised for the affection of the kidneys is equally calculated to remove the anasarca connected with it, which supervenes during the period of desquamation or convalescence. General bleeding, if the pulse be full and the child strong, as advised by Sydenham, Richter, and others, or cupping or leeching with diaphoretics, and baths, are the remedies upon which we must chiefly rely; but I am anxious to recommend the vapour bath especially, from the great benefit I have seen derived from it. It may be easily administered without the usual expensive apparatus. Take a cane-bottomed chair, suspend a pan of hot water underneath, near to the floor, and place under it a spirit lamp, and then cover the seat and legs of the chair with a blanket, so as to prevent the hot steam from scalding the child; then place the child, naked, upon the seat, and envelope the chair and the child (except his head) in a blanket. In a few minutes the child will have a comfortable and complete vapor bath, which is far less exhausting than a common warm bath, and has a more beneficial effect upon the anasarca.

When, after the nearly complete disappearance of the œdema, and the return of the urine almost or altogether to a healthy state, the child still continues pale, and languid, and feeble, the tincture of the sesquichloride of iron is the best tonic that can be administered, and under its use any traces of albumen that previously existed in the urine will be altogether removed.

The diet of the child during the simple and anginose scarlatina should be restricted, and of a bland character; in angina maligna we may have to give broths, beef-tea, jelly, or even wine and brandy. I would wish, in this edition, to express even more strongly than in the former one, the necessity which exists for a moderate and bland diet, during convalescence, especially where there is any tendency to anasarca. By a stimulating diet, any febrile action is kept up, and the stomach and bowels become disturbed. Milk, farinaceous food of any kind, and occasionally a little weak broth, will be sufficient for a week or two, after which the diet may be increased, and if tonics be deemed necessary, I am inclined to think a weak decoction of bark is better than wine.

During the height of the disease the child should be moderately covered with clothes, the room to be kept cool and well ventilated. We must remember that during convalescence the sequelæ of the disease arise, and therefore great care should be taken that the child be warmly clothed and not exposed to cold or damp. Even when con-

valescence seems going on satisfactorily, I would recommend that the child should be confined to the house for two or three weeks. I have repeatedly seen children, who appeared perfectly well, allowed to go out with due precautions, who yet caught cold, and were attacked by some of the sequelæ of scarlatina.

Prophylactic Treatment.—Many plans have been suggested for preserving individuals from scarlatina. Dr. Withering recommends the frequent expectoration of the mucus that collects upon the mucous membrane of the fauces and nose, and that when the infection has been imbibed, the person should take an emetic, wash the mouth with soap-leys diluted with water, and promote sneezing, then go to bed and take wine whey with spirits of hartshorn. He advises that when a family or school is attacked the members should not be dispersed, but, "allotting apartments on separate floors to the sick and healthy, choosing for nurses the older parts of the family, or those who had already had the disease, and prohibiting any more communication between the sick or their attendants and the healthy, with positive orders to plunge into water all the linen, &c., used in the sick chambers, have universally been found sufficient to check the further progress of the infection. Dr. Sims thinks the best precaution to be to take so much rhubarb every morning as will produce a loose motion in the day. Dr. Williams thinks this precaution as effectual as that of Hahnemann, if not much more so.

Hahnemann recommended a minute portion of belladonna to be taken twice a day. Ettmuller, Berndt, Korrf, and Hufeland believe in its good effects. Salzer and others have found it useless; and Hildenbrand and others treat it with ridicule. Dr. Stievenart of Valenciennes tried it upon 200 individuals during an epidemic of scarlatina near Valenciennes, and all escaped the disease. "In an epidemic which occurred in South Carolina Dr. Irwan made a very extensive trial of the prophylactic properties of belladonna. Three grains of the extract was dissolved in one ounce of cinnamon water, and two or three drops of the solution were given morning and night to a child under one year old, and one drop more for every year above that age. Of 250 children who took the belladonna, less than half a dozen had the disease, and but very mildly. After eight or ten days' use of the medicine there occurred an eruption over most of the surface, in some cases profuse and troublesome from itching. Those families who did not take the preparation had the disease with scarcely an exception."* Dr. M'Kee made a similar trial with success. Dr. Condie found it of no use. Guersent and Blache, Rilliet and Barthez, think it deserving of further trial.

Mr. Tuffnell has mentioned to me two trials that he made of it. In the first, scarlatina of a very malignant form broke out in an estab-

* Condie on Diseases of Children, p. 441.

lishment where there were 29 children of different ages who had not previously had the disease. Ten were attacked and the remainder put under the influence of belladonna, not one of whom contracted the disease. On the other hand, in a family of children, five of whom had not had scarlatina, the eldest being attacked, the others took belladonna, but all successively sickened and had the disease more severely than the first.

I do not think that the evidence brought forward in favor of the protecting powers of belladonna is at all as weighty as the evidence of its failure. Children do escape the infection without belladonna, and therefore to attribute the immunity to it when it has been taken is rather a hasty conclusion; whereas the negative results are almost conclusive, *i. e.*, if any number of children having taken belladonna have scarlatina, it must be from its want of protective power.

Calomel has been recommended by Kreysig and Selig; Theussink, calomel and the golden sulphuret of antimony; Eichel, emetics, followed by diaphoretics. Others have recommended the mercurial acids, or capsicum, quinine, camphor, &c.

Whether there be any special prophylactic or not, I cannot say. I am sure that good food, fresh air, exercise, ventilation, cleanliness, &c., by promoting the health, may either preserve from the disease, or will tend to diminish its severity.

CHAPTER III.

VARICELLA. CHICKEN-POX. SWINE-POX.

THIS is a trifling disorder, hardly worthy of the name of an eruptive fever. It was confounded with smallpox until Dr. Heberden published his Memoir,* and ever since there have been controversies as to whether or not it is a modified variola. Valuable descriptions have been given by Frank of Vienna, Willan, Heim, Mohl, Thompson, Gregory, &c. Dr. Gregory defines the disease as "a slight disorder, the offspring of a specific miasm, which, without irritating fever, throws out an eruption of confluent vesicles, which mature in three days,

* Trans. of College of Physicians, London, vol. i.

and desiccate into granular scabs, which speedily fall off. Little or no fever accompanies the mature stage, and no secondary fever follows. The disorder chiefly prevails among children, and occurs but once in life."

The period of incubation is very short—from four days to a week; and Heberden, Plenck, Rayer, and Gregory, speak of it as latent, affording no symptoms; but Dr. Willan states that occasionally the patient complains of languor and somnolency, with a furred tongue, hot skin, and quick pulse, with sore throat, and rheumatic pains. Dr. Bateman says that "some degree of fever generally precedes the eruption of varicella for a couple of days, which occasionally continues to the third day of the eruption. This is sometimes very slight, so that it is only recollected as having been previously indicated by fretfulness after the eruption appeared. I have seen the eruption appear without preliminary fever, but I have also seen it preceded by irritability, discomfort, dislike of exertion, and fever."

Whether ushered in by fever or not, at the end of a few days the eruption appears, sometimes preceded, for a few hours, by a general erythematous rash, or a few red patches here and there, upon which there appear simple vesicles filled with clear transparent serum, as if the skin had been blistered with boiling water. Many of the vesicles appear upon the skin with no surrounding redness, but the clear vesicle upon the white skin. It usually commences on the breast and back, then on the face and scalp, and lastly on the extremities, and it appears in successive crops for a few days, the old ones dying away whilst the new ones are forming. The eruption is accompanied with a degree of itching and tingling, and the child generally rubs off the head of the vesicle, and the exposed surface becomes irritated and sore; occasionally they become inflamed and a kind of pustule forms, which has led to some confusion. If the vesicles remain unbroken for twenty-four hours they become opaline and then opaque, and by degrees they dry and form small granular scabs.

There are few or no constitutional symptoms accompanying the eruption; the little disturbance that preceded it generally subsides on its appearance; the tongue is pretty clean, the pulse quiet, the skin cool, and the appetite good. After a few days, the scabs fall and all traces of the disease disappear. The entire course may be completed within a fortnight.

The *modifications* of the disorder have reference principally to the form of the vesicles. Willan described three varieties: the lenticular, conoidal, and globate; which are thus characterized by Dr. Bateman: "the *lenticular* appears on the first day of the eruption, in the form of small red protuberances, not exactly circular, but tending to an oblong figure, having a nearly flat and shining surface, in the centre of which a minute transparent vesicle is speedily formed. This on the second day is filled with a whitish lymph, and is about the tenth of an inch in diameter. On the third day the vesicles have undergone no change,

except that the lymph is straw-colored. On the fourth day those which have not been broken begin to subside, and are puckered at their edges. Few of them remain entire on the fifth day, but the orifices of several broken vesicles are closed, or adhere to the skin so as to confine a little opaque lymph within the puckered margin. On the sixth day small brown scabs appear universally, in place of the vesicle. The scabs on the seventh and eighth days become yellowish, and gradually dry from the circumference towards the centre. On the ninth and tenth days they fall off, leaving, for a time, red marks on the skin without depression. Sometimes, however, the duration of the disease is longer than the period just stated, as fresh vesicles arise during two or three successive days, and go through the same stages as the first. In the conoidal varicella the vesicles rise suddenly, and have a somewhat hard and inflamed border: they are, on the first day of their appearance, acuminate, and contain a bright, transparent lymph. On the second day, they appear somewhat more turgid, and are surrounded by more extensive inflammation; the lymph contained in many of them is of a light straw color. On the third day, the vesicles are shrivelled; those which have been broken exhibit at the top slight gummy scabs, formed by a concretion of the exuding lymph. Some of the shrivelled vesicles which remain entire, but have much inflammation round them, evidently contain on this day purulent fluid; every vesicle of this kind leaves after scabbing a durable cicatrix or pit. On the fourth day, these dark brown scabs appear intermixed with others which are rounded, yellowish, and semi-transparent. These scabs gradually dry and separate, and fall off in four or five days. A fresh eruption of vesicles usually takes place on the second and third day, and as each set has a similar course, the whole duration of the eruptive stage in this species of varicella is six days; the last-formed scabs, however, are not separated till the eleventh or twelfth day. "In the swine-pox or hives (for in the south the former appellation is applied to both the second and third species) the vesicles are large and *globated*, but their base is not exactly circular. There is an inflammation round them, and they contain a transparent lymph, which on the second day of the eruption resembles milk-whey. On the third day the vesicles subside, and become puckered and shrivelled, as in the two former species. They likewise appear yellowish, a small quantity of pus being mixed with the lymph. Some of these remain in the same state till the following morning, but before the conclusion of the fourth day the cuticle separates, and then blackish scabs cover the bases of the vesicles. The scabs dry and fall off in four or five days."*

A more severe form is occasionally seen, in which, owing probably to the bad constitution of the child, more or less of the vesicles become round, clear cut ulcers. Dr. Charles Johnson mentioned to me a case

* Bateman on Cutaneous Diseases, p. 210.

in which each vesicle in the course of 24 hours became an ulcer like "burnt holes."

There seems to be no doubt that the disease is both contagious and epidemic; we constantly see it communicated successively to every member of a family or school. Dr. Bateman mentions that varicella may be propagated by inoculation with the lymph of the vesicles, and that it may be introduced whilst the constitution is under the influence of vaccination, without modification of either disease: "that smallpox, inoculated during the eruptive fever of varicella, proceeds regularly in its course without occasioning any deviation in the latter; but that when variolous and varicellous virus is inserted at the same time, the smallpox proceeds through its course, while that of the chicken-pox is in a great degree interrupted."* Mr. Bryce, of Edinburgh, made many attempts to propagate the disease by inoculation, but failed in all.†

I have already mentioned that, up to the time of Heberden, the disease was confounded with smallpox. Since that time many persons have regarded it as a modification of smallpox, and recently Dr. Thompson has maintained this opinion, mainly because, as he states, varicella prevails where variola prevails, and never without, and that, therefore, the generating miasma must be the same in both; and that chicken-pox is never witnessed in children who have had small-pox. As to the first, Dr. Mohl states that from 1809 to 1823, chicken-pox was observed annually at Copenhagen without variola. M. Eichhorn mentions varicellous epidemics without variola, and Mr. Burnes relates a similar occurrence at Carlisle in 1826. Dr. Gregory has also shown that children may take chicken-pox after cowpox, or the reverse, or may have both at the same time. Further, the inoculation of chicken-pox never produced either variola, varioloid, or vaccinia. M. Rayer agrees with Dr. Thompson, and suggests that the chicken-pox, which occurs some time after an epidemic of smallpox, may be "a last effort of the variolic medical constitution."‡ M. Alibert does not believe that the miasm of varicella can give rise to variola, and he mentions that chicken-pox occurs not merely in those who have been vaccinated, but in those who have had smallpox.§ MM. Guersent and Blache regard varicella as a disease *sui generis*, and have refuted the positions of Dr. Thompson.||

Diagnosis.—The very slight fever, or its entire absence, the vesicular eruption, the clear, watery contents of the vesicles, and the insignificant character of the attack, distinguish it from all other eruptive fevers.

* Willan on Vaccination, p. 97.

† Thompson on Varioloid Diseases, p. 74.

‡ Dict. de Méd., vol. xv.

§ Monographie des Dermatoses, vol. ii. p. 342.

|| Dict. de Méd., vol. xxx. p. 548.

There is some resemblance between it and that variety of smallpox which has been termed *varioloid*, but in the latter there is more fever; the eruption is partly vesicular and partly pustular, and the contents of the vesicles are never the clear, transparent lymph we find in varicella.

Treatment.—Little or none is necessary. The child should be kept within doors for a few days, abstain from animal food and heating drinks, and take a gentle purgative once or twice.

CHAPTER IV.

SMALLPOX. VARIOLA. PETITE VEROLE.

THIS is the most distressing and most fatal of all the eruptive fevers. It may be defined as a pustular disease, preceded by fever which subsides, but is again excited at a more advanced stage, and which terminates in a scab. It is contagious and epidemic, and attacks a person but once in his lifetime.

M. Hahn, Dr. Willan, and Dr. Baron believe that the disease was known to the Greeks and Romans. Dr. Mead, Dr. Friend, Dr. Gregory, and others maintain the contrary. It was first described by Rhazes, and after him by Avicenna, and by innumerable writers since, among whom Sydenham decidedly holds the first rank, not merely as an accurate observer, but as having applied his sound judgment to the improvement of the treatment. Of the period when it was first introduced into Europe, or even into England, we know little. Dr. Hillary* says that Gilbertus Anglicus (1280) and John of Gaddesden (1310 or 1320) allude to the disease as one well known. Dr. Monro mentions that some authors have maintained that it was introduced into Europe in the eighth century, on the invasion of the Saracens, and into England in the ninth; but Dimsdale, Mead, and others, place it two centuries later.† In the year 1721 inoculation was introduced

* A Practical Essay on the Smallpox, 1740, p. 19.

† Monro on the Smallpox, p. 48.

into England by Lady Mary Wortley Montague, from Constantinople, and was, at that time, a great improvement in the history of the disease, in consequence of the diminished mortality which it insured. This has been superseded by the glorious discovery of Dr. Jenner, and is now abolished by Act of Parliament.

Mr. Wilde has shown satisfactorily the antiquity of this disease in Ireland; he observes that "the time at which this disease first made its appearance in Ireland has not been as yet fully determined; it must have been in existence long prior to the date of the English and Latin authors of the fifteenth and sixteenth centuries; for the Irish manuscripts refer to it at the beginning of the fifteenth century; it is described in the Book of O'Shiel under the name of *bolgach*, which means, literally, blisters or pustules containing matter; but water-blisters (vesicles or bullæ) are generally termed *clog*. One of the Irish translators in the fifteenth century states that smallpox and measles (which in the manuscripts are generally mentioned together) form in pustules all over the body, and are generated from a vitiated state of the red blood and humours; but that the smallpox is produced from a vitiated state of the red blood alone, and measles from a depraved condition of the humours. The work of Bernard on the smallpox and measles is mentioned in the Book of O'Shiel." "The total number of deaths from this cause during the ten years amount to 58,006, in the proportion of 100 males to 96·45 females." "The proportion of this to the general mortality appears from the returns to be 1 in 20·46, and, compared with all of the epidemic class, 1 in 6·57; being, next to fever, the most fatal epidemic affection in the country."*

Smallpox has been divided into discrete and confluent, mild and malignant, with several subdivisions. I shall first describe the disease as we ordinarily see it, and then its modifications.

Symptoms.—For the facility of description I shall, as in the case of measles and scarlatina, divide the disease into periods or stages.

1. *Period of Incubation.*—After exposure to contagion a certain period elapses before the child shows any symptoms of being affected, beyond, perhaps, some uneasiness, an unwillingness to play as usual, and an "unquiet silence," as M. Alibert expresses it. It is not easy to fix the length of this period: Boerhaave and Stoll say six or seven days; Dr. Gregory from ten to sixteen days.

2. *Period of Invasion.*—At the termination of the period of incubation, the early symptoms of fever show themselves; the child is chilly, shivering, creeping to the fire; complains of headache; is uneasy, cross, and hard to please. This state is succeeded by heat and dryness of the skin, and a quick and full pulse; the appetite is lost; there is nausea, with occasional vomiting, generally constipation, rarely

* Reports upon the Tables of Deaths, pp. 11, 12.

an attack of diarrhœa. The tongue becomes loaded, but red at the point and edges, and there is great thirst; the child is completely prostrated, and complains of aching in the limbs, the back, the epigastrium, and in various other parts. The pain in the loins is so unusually severe that Dr. Gregory and others have regarded it as peculiar to smallpox, and aiding in its diagnosis in this stage. In some cases there is some lachrymation, with injection of the conjunctiva, redness and swelling of the amygdalæ, sore throat, and pain and difficulty in swallowing. In others there is præcordial oppression, dyspnœa, dry cough, with a sense of heat and soreness in the larger bronchial tubes, flying pains in the chest, and palpitation.

Or this period may be marked by the predominance of nervous symptoms, agitation, restlessness, sleeplessness, or a sudden waking from sleep with a start and crying, but nothing more formidable. In more severe cases the child may become delirious, or pass into a state of stupor and coma, or be attacked by convulsions resembling epilepsy. Sydenham regarded these epileptic attacks as characteristic, where there was no irritation from teething, and states that he has foretold in such cases the appearance of the eruption of smallpox.* Rayer mentions that these cerebral attacks may prove fatal even before the eruption appears, or soon after.†

The duration of this period is generally about three days; occasionally the eruption appears on the second day, or not till the sixth or seventh. Generally the eruption is earlier in confluent and severe cases than in those where it is discrete and slight. In twenty-six cases of normal variola, Rilliet and Barthez state that the duration of this stage was one day in one case; two days in eleven cases; three days in nine cases; four days in four cases; and six days in one case. Of thirty-five abnormal cases, it was a few hours in one case; one day in four cases; thirty-one hours in one case; two days in twelve cases; three days in five cases; four days in six cases.‡

3. *Period of Eruption.*—This stage dates from the first papular appearance to the time when the pustules are filled with pus. At the first we observe small round isolated spots, which soon become full, solid, and prominent papulæ, of a more or less vivid red color, which disappear under pressure to reappear immediately. We observe them first on the face, then on the neck, and by degrees upon the limbs, body, hands, and feet. These papulæ gradually increase in size and change their character. The epidermis on each is slightly elevated by a drop of serum of a yellowish-white color, not so transparent as that of varicella. The time of this change is not the same for all the papulæ, inasmuch as they appear in successive crops on different parts of the

* Works, vol. ii. p. 153.

† Traite des Mal. de la Peau, vol. i. p. 516.

‡ Mal. des Enfants, vol. ii. pp. 441, 442.

body, and the earlier ones become vesicular the first, then the others in the order of their succession, occupying from twenty-four hours to two or three days in the process. Rilliet and Barthez think that the length of this period is inversely as the length of the prodromi. At first the vesicles are small, especially upon the papulæ which were acuminate, but by degrees they become flattened at the top, and spread out laterally until they cover the papulæ and are much larger than them. They lose their semi-transparent character, and become opaline. The vesicles are surrounded by an inflamed base, sometimes flat, in other cases somewhat elevated above the level of the skin: if the vesicles be not too distant, their areolæ are in contact, so that the skin is of a bright red color between the vesicles. The vesicles themselves vary in number, and, when numerous, may run into each other, constituting what is called "confluent smallpox," and exhibiting just such severity of symptoms as might be expected from the extent of inflamed and suppurating surface. This confluence may occur in patches of different size over the surface, but especially upon the face, which is now more severely affected than any other part. On the body and limbs the vesicles are generally distinct, and when they are universally so, it is called "discrete smallpox."

The papulæ assume the character of vesicles about the second day; sometimes, though rarely, a day later, and in about two or three days more they again change and become pustular. The vesicle which had spread out and become flatter now becomes depressed in its centre, leaving the borders round and elevated; the serum which had become opaque, now becomes purulent, and the eruption has the pustular appearance, at first on the face, then on the neck, body, limbs, &c., just in the order in which it appeared. This observance of a regular order of succession is remarkable; in consequence of it, we may see in the same case papulæ and vesicles, or vesicles and pustules, but never papulæ and pustules, because the time required to convert the vesicles into pustules has been sufficient for the transformation of all the papulæ into vesicles. The duration of this period is from four to six days.

The fever and general disturbance we noticed during the period of invasion continue for a short time after the appearance of the eruption, and then either disappear or are considerably reduced in severity; but as the disease assumes its true character, we find considerable irritation of the mucous membrane of the mouth, pharynx, and larynx. Sometimes the tongue is much swollen, and there is a profuse discharge of saliva. The face also, especially the eyelids, and the neck, are swollen.

4. *Period of Suppuration.*—It is somewhere about the fifth or sixth or, according to Sydenham, the eighth day, that suppuration commences; the liquid in the vesicles from semi-transparent, becomes opaque, then of a dull white, and lastly of a yellow colour; at the same time the pustules increase in size, the depressed centre is again

raised, and they become more spherical. On the extremities we occasionally find pustules which preserve their opaline character during the entire of this period, and others which assume a livid appearance, as if from the effusion of blood. On the surface of the pustules themselves, at the beginning of this stage, we may observe small semi-transparent gray or yellow points, the former owing to an arrangement of the epidermis, the latter to new matter deposited under the epidermis. Rilliet and Barthez call these "*pointillés de couleur*." They are generally seen upon the pustules of the face, or on the body and thighs, and they disappear about the seventh or ninth day of the eruption, when the pustules are completed, or perhaps just as desiccation commences. On the pustules of the hands, feet, and arms, instead of these points, we may observe concentric circular marks, gray and semi-transparent, or clear yellow, alternately. When two pustules touch, the outer yellow circles of each are broken and confused. The gray circles are broader at the commencement, but the yellow ones increase until they occupy the entire pustule. The process of pustulation follows exactly the same order as the development of the papulæ; those on the face, which appeared first, being first perfected, then those on the neck, body, limbs, hands, and feet. The more advanced the eruption, the more confluent it appears; and the more abundant the crop of pustules, the more confluent they become, because this gradual increase which we noticed brings them into contact with each other; and many parts which were very distinct at the beginning, end by becoming quite confluent.

The period of suppuration lasts from four to six days, and it is marked by a return or an increase of the fever; but in this stage it is called the suppurative or secondary fever. Its amount or intensity is generally in proportion to the extent and confluence of the eruption; slight in discrete smallpox, it acquires great severity in the confluent form; the pulse ranges from 100 to 140, full, strong, and regular; the skin is very hot and dry; there rarely is any perspiration. The face is enormously swollen, the eyelids quite closed, and the aspect utterly changed and frightful. In addition, the mucous membrane of the fauces, pharynx, air-tubes, and digestive passages, is in a state of great congestion and irritation, if not of inflammation. "In a large portion of confluent and in some semiconfluent cases, the mucous membrane of all these parts to which the atmospheric air gets access (the nose, mouth, and trachea) is occupied with the eruption, sometimes distinct, more generally confluent. The only symptoms occasioned by this mucous complication are as follows: numerous white points appear on the tongue, palate, and velum pendulum. Hoarseness and alteration of voice indicate that the same condition extends to the mucous membrane of the larynx and trachea. There is great pain and swelling, and, in bad cases, cough and dyspnoea. The cough is at first dry and teasing; as the disease progresses, there is expectoration; about the eighth day, a

copious viscid secretion takes place from all the affected structures.”* In many cases there is delirium, agitation, coma, &c., so that at a later period of the disease we seem to have its first acute febrile and inflammatory character reproduced, and this continues until the desiccation has fairly set in.

This secondary fever is supposed to result from absorption of the purulent matter and its mixture with the blood. If the eruption be limited, the quantity of purulent matter absorbed is small, and the result is fever, without complication; but in very confluent cases, the amount of purulent matter absorbed is sufficient to taint the whole system, and to produce all those phenomena which result from such a poison analagous to those which arise from phlebitis, such as typhoid or ataxic fever, metastatic abscesses in the lungs, liver, and cellular tissue; arthritis with effusion, &c. Sydenham seems to allude to this result when speaking of the epidemic of 1674: “Of this I am certain, that the present smallpox exactly resembled that of the preceding constitution, only it seemed to be of a grosser nature, and attended with a much greater degree of putrefaction. And from these two causes it followed that when the eruptions were very confluent, it destroyed abundance more than any other sort I had yet seen, and in my opinion proved as fatal as the plague itself,” &c.†

“Often, indeed,” says Dr. West, “it assumes a typhoid character; the pulse becomes extremely frequent and feeble; the tongue dry and brown; and the patient dies delirious. In other instances, the maturation of the pustules goes on for a day or two, with very slight reaction; and were it not that this extreme mildness of the secondary fever, in cases where the eruption has been abundant, is itself a suspicious circumstance, we should be disposed to express, without hesitation, a most favorable opinion as to the patient’s condition. Suddenly, however, the pulse begins to falter, the pustules, which before seemed full, collapse; the extremities grow cold; and in a few hours the patient dies. This fatal change is sometimes ushered in by a fit of convulsions; at other times it is preceded by a condition of the extremest restlessness, which contrasts remarkably with the extreme quietude of the child’s manner for the two or three previous days.”‡

5. *Period of Desiccation.*—Like the other phases of the disease, this further process commences in the face first, so that this part may be covered with crusts at a time when the pustules are but just arrived at maturity upon the limbs. The tumefaction diminishes, the pustules dry up, and the crusts which result form a mask over the entire face. The features are hidden by a thick, brown incrustation, which falls off about the fifth or sixth day after its formation, to be succeeded by fur-

* Gregory on Eruptive Fevers, p. 47.

† Works, vol. ii. p. 322.

‡ Diseases of Infancy and Childhood, p. 468.

furaceous scabs, which fall, and are renewed several times before the skin is clear. The more confluent the disease, the more humid are the crusts. But when the pustules ulcerate, which is very common in confluent smallpox, some blood may escape, which will give to the crusts a black color; and when they fall off, we find the skin irregularly destroyed, so as to form pits, seams, or cicatrices, which give to the countenance a very frightful appearance. These pits or seams are much more frequent on the face than on any other part of the body, because it is there that the eruption is more abundant and confluent, and that the inflammation, being more intense, is more liable to run on into ulceration of the cutis. The odour from the patient during this period is most offensive and sickening; the tenderness of the surface is so great, that it is impossible to observe great cleanliness; and the accumulation of purulent matter, the extent of suppurating surface, the fetid breath, occasions a disgusting and impure atmosphere around the patient. A very distressing itching accompanies the formation of crusts, the more annoying as rubbing or scratching the parts is attended by pain, and leads to still greater disfigurement.

MM. Rayer, Rilliet and Barthez, and others, mention that in some cases there is neither desquamation nor formation of crusts; the pustules become flat in the course of forty-eight hours, owing, probably, to the absorption of the pus, and that, coincident with this change, there is a sudden prostration and other phenomena analogous to those observed in animals into whose veins pus has been injected. Rilliet and Barthez have described several modes in which this desiccation takes place. 1. In the first, the epidermis of the pustule cracks in the centre or circumference, and the pus and false membrane, being exposed to the air, concrete into a yellow crust, at first moist, then dry, rough and unequal at first, occupying only a portion of the pustule, but afterwards occupying the entire: it is connected with the neighboring ones at its circumference. 2. In other cases, a small, dry, yellow, semi-transparent crust is formed, occupying the entire pustule, and if we detach it, the surface underneath will be found red, moist, elevated, and perhaps bleeding; when the crusts fall, they leave a red, uniform level surface, which gradually loses the red color, and exhibits no cicatrix. 3. A small scale may form in the centre of the pustule, surrounded by purulent matter, the epidermis having desquamated and being detached. This mode leaves no mark. 4. Lastly, the pustules do not break, but become gradually flattened from the absorption of the pus, and the epidermis, smooth and softened, is separated from the cutis by a layer of false membrane, which forms a thin crust of a yellow color, and which, with the epidermis, dries and falls off in large scabs, leaving a smooth and slightly red surface underneath.

Let us now inquire as to the eruption upon the mucous membranes. Small elevations, surrounded by a circle of inflammation, may be observed in the mucous membrane of the mouth and fauces, and at the

end of two or three days these change color, and become white or gray, and on their surface there is a small patch of false membrane, which is detached after a few days, leaving a slight erosion, or superficial ulceration, which is not followed by cicatrix. In the pharynx and œsophagus, pustules are occasionally observed, somewhat modified by the structure of the part, and pustules have also been observed at the rectum.

Death may take place at any stage; before the appearance of the eruption, during its course, or after desiccation. In 168 fatal cases mentioned by Dr. Gregory, death occurred between the third and seventh days in 32; between the eighth and twelfth, in 83; between the twelfth and twentieth, in 39; and between the twenty-second and thirty-eighth, in 16 cases.

Modifications.—The preceding description embraces only ordinary cases of smallpox, but we find in practice that in many cases the appearance and course of the disease deviates widely from the ordinary standard, and in others, whether normal or anomalous, it is very seriously complicated with some organic affection. Let us enquire a little into each of these phases.

1. It sometimes, though rarely, occurs, that there are either no precursory symptoms, or that they are unusually short in duration. On the other hand we sometimes see the fever lasting several days, with no other symptom, or with only diarrhœa. Much depends, no doubt, upon the previous state of health, and whether the variola is primary or secondary.

2. The eruption may appear irregularly, showing itself first upon the body or arms, and thence spreading to the face; or it may appear full upon the face and very sparingly upon the body. In some cases the eruption scarcely assumes the true pustular character, or, whilst some of the spots go through their proper course, others remain vesicular, with clouded serum instead of pus.

3. In some very severe and fatal cases the pustules are red, livid, or filled with blood (*hemorrhagic variola, or black smallpox of Sydenham*). In other cases we may find petechiæ or ecchymoses in different places, with hemorrhage from the kidneys, bowels, &c., speedily carrying off the patient. My friend, Mr. Smyly, has given me the notes of two such cases: and it is remarkable that in such cases the eruption is seldom, if ever, fully developed; it may remain either papular or vesicular. As this form of the disease is comparatively rare now, it may be worth while extracting the following graphic description from Dr. Hillary's work: "The bleeding smallpox is the very worst sort, and seems to proceed from a conjunction of several of these causes in their most violent degree. The infection is probably the most pernicious, the habit of the person unfavorable, and strongly disposed to receive the infection." "The invasion is mostly attended with convulsive, racking, lancinating pains in the lower part of the back and loins, so intolerable that at every spasmodic shoot the patient cannot refrain

from starting and crying out as if he were stabbed with a sword; he has also a violent shooting pain in his head; his eyes are extremely inflamed; he breathes very quick, short, and laboriously, and his pulse is quick, weak, and frequent: though sometimes the purple spots and hemorrhages will come on without any other symptoms but the two last, though not often. The sick have first a flushing in their faces, breasts and backs, and shortly after a redness like that in the scarlet fever appears all over the body; the pustules do not rise, but stand in the skin like a flat, continued, red swelling; after this redness an infinite number of small red or purple petechiæ will appear all over the body and limbs, which afterwards turn to a dusky brown, livid, or black color, and sometimes spread very broad: the pustules, likewise, are spotted or turn black in the middle, which dimple in and do not rise. Sometimes a colliquative profuse salivation comes on thus soon, which is afterwards often mixed with blood.”*

4. Again, the vesicles and pustules may be either unusually small or unusually large. In the latter case they are flattened and not distended, and the false membrane has not its usual character. Occasionally large bullæ are seen on the limbs, wrists, ankles, &c. but never on the face; filled with serum, and when dried forming large scales. This was noticed by Sydenham in the epidemic of 1670.

5. The fever, which ordinarily subsides very much, if not completely, when the eruption appears, in other cases continues unabated in intensity.

6. Suppuration may not take place satisfactorily; it may be incomplete or excessive, or mixed with hemorrhagic blotches. The fever may take a typhoid type, and very formidable complications occur.

7. *Varioloid*.—A modified kind of smallpox, which is termed varioloid, occurs occasionally either after vaccination, inoculation, or casual smallpox, and it is more frequent after the age of fourteen than before, perhaps from the vaccine influence having worn out. The precursory symptoms are not generally severe, though in some cases there is a smart febrile attack. The eruption is not ordinarily very extensive, and chiefly occupies the face and trunk. It does not assume the flattened pustular form, but is more spherical, and is filled with yellow serum or pus. After a few days the vesicles or pustules dry up and form small round scabs, which fall off, and leave no indentation after them. The fever subsides as soon as the eruption appears, and there is no secondary fever. The extent of pustulation varies much; some have only ten or twenty spots; others, as I have seen, are pretty well covered with them. It rarely happens that any complication aggravates the attack. It is undoubtedly contagious, and it has been remarked that it may reproduce true smallpox in another person. It is doubtful whether an attack of varioloid affords protection from smallpox subsequently.

* On the Smallpox, p. 123.

8. Ordinarily smallpox attacks an individual but once in his life; there are, however, well authenticated cases on record where it occurred a second or even a third time, though in general these assume the form of varioloid.*

9. During the prevalence of epidemic smallpox numerous cases of a febrile affection frequently occur, marked by tenderness of the epigastrium, pain in the back and limbs, some degree of soreness of the throat, salivation, profuse perspiration from which no relief results, and not unfrequently petechiæ. This has been denominated *variolous fever without eruption*. This fever generally begins and ends with the variolous epidemic. We have repeatedly met with such cases, as well in the unprotected as in those who have been vaccinated, or who had previously had the smallpox. That the disease results from the same infection as the smallpox we have no doubt; whether it affords subsequent immunity from the latter we have had no means of judging.†

Complications.—1. The *nervous system* is frequently more or less involved. I have already stated that headache is an accompaniment of the fever, and that we may also have delirium, agitation, stupor, coma, or convulsions, in the period of invasion. We have seen how characteristic Sydenham thought the epileptiform attacks, and I may add that head symptoms are by no means uncommon in the suppurative stage of bad cases. Dr. Condie observes that “the same affection of the brain that follows the destruction of large portions of the skin by burns or scalds often occurs. The symptoms are severe: repeated rigors, followed by general tremors; a quick, thready, and tremulous pulse; a dry brown tongue; collapse of the features; cold extremities; subsultus tendinum; and death.”‡ Of 112 patients who died of the disease in 1825, M. Guersent did not find a single example of meningitis or encephalitis, but occasionally a kind of passive injection of the membranes. I need not add that any cerebral attack is a most formidable complication, and may in itself prove rapidly fatal.

2. *Coryza*.—*Epistaxis*.—A sero-sanguinolent discharge from the nostrils is by no means unfrequent, owing to the inflammation and pustulation of the mucous membrane of the nose.

3. *Laryngitis*.—Croup occurs occasionally in the course of smallpox, but not very frequently.

4. *Bronchitis* alone is rare, and not very important, but it is not unfrequently complicated with pneumonia. It rarely occurs before the tenth day.

5. *Pneumonia*.—Inflammation of the lungs is not very uncommon, and it has a serious influence upon the result of the variola. According to Rilliet and Barthez, “the pneumonia of variola commences

* Gregory on Eruptive Fevers, p. 73; Monro on Smallpox, p. 77.

† Condie, Diseases of Children, p. 509.

‡ Diseases of Children, p. 508.

either during the first days of the eruption, or during convalescence. In the first cases, the variola was secondary and anomalous, two patients having varioloid, one normal, the other abnormal, so that it may be questioned whether the irregularity depended upon the primary disease, or upon the pulmonary complications. We think that both causes may have contributed to produce this effect. On the contrary, in the second series, the variola was primitive and normal; the complication had no influence upon the eruption. With one only of our patients the pneumonia occurred at an intermediate period, *i. e.*, on the eighth day of the eruption; the variola was abnormal; the effect of the pneumonia was to discolor it almost instantly, and to add to the previous irregularity a remarkable paleness. Pneumonia, rare, and without bronchitis, may be overlooked in our investigation. When more extensive, it is only by auscultation and percussion that it is known, and these methods are sometimes difficult to use; the disgusting odour, the necessity of interposing several layers of linen between the sufferer and the ear, occasion us to overlook the pneumonia until the autopsy. The cough hardly draws attention to the pulmonary organs, inasmuch as it may be caused by the pharyngo-laryngitis: but when at the period of desiccation the symptoms increase instead of diminishing, we may suspect some pulmonary disease, and call to our aid auscultation for its detection. The prognosis of variolous pneumonia is very serious, but the mortality is greater in the irregular forms of variola. The pneumonia is less serious when it occurs during convalescence, and particularly when it is lobar.* Fabre states that lobar is more common than lobular pneumonia.

6. *Salivation. Muguet.*—In some cases we find a continual discharging of a viscid, limpid, and frothy fluid from the mouth. It generally occurs from the fourth to the eleventh day, but Rilliet and Barthez have seen it come on on the eighteenth; and chiefly about the age of six years or after. It attacks those who recover as well as those who die, and most frequently in the anomalous and confluent variola. It may, perhaps, be owing to the inflammation or pustulation extending up the salivary ducts, or perhaps to sympathetic irritation. Pseudo-membranous inflammation of the gums, mouth, or pharynx, may occasionally be observed, and, in a very few cases, gangrene of the mouth.

7. *Gastro-enteritis. Entero-Colitis.*—We have seen that smallpox may be accompanied with great irritation of the stomach, vomiting, &c. This may continue some days, and then cease, and it may return at a later period. The digestive functions are, of course, suspended during the disease. Dr. Gregory states that "smallpox is singularly exempt from all abdominal complications," but that mucous enteritis sometimes occurs. But the lower portion of the intestines is much

* Mal. des Enfants, vol. ii. p. 503.

more commonly affected in variola, as Guersent and Blache have observed, and this is one of the most common complications of the eruptive disease. In the normal form it commences from the eighth to the twenty-fourth day, and rarely before, but in the abnormal it may show itself on the first or second day. Diarrhœa is the symptom which is present in almost all these cases of entero-colitis, sometimes after constipation, with swelling, tension, and tympanites of the abdomen, and sometimes without. It is always a very serious, often a fatal, complication.

8. *Hemorrhages*.—In severe typhoid cases of smallpox we occasionally find a discharge of blood from different organs, epistaxis, bleeding from the gums, petechiæ on the skin, hemoptysis, hematuria, and hemorrhage from the intestines. None of these are very common, but all are of importance, either in themselves when extensive, or as indicating a very deteriorated condition of constitution. All these attacks have been noticed by Sydenham, and others since his time.

9. *Ophthalmia*.—No portion of the mucous membranes shows more distinctly or more frequently its participation in the pustular eruption; not merely is the conjunctiva inflamed, but the deeper tissues are inflamed, softened, and ulcerated, especially the cornea. Rilliet and Barthez have noticed different degrees of keratitis. In the first there were slight spots upon the cornea, surrounded by a red circle, and with great congestion of the vessels of the conjunctiva. In the second, ulceration had taken place; in some to a limited extent, and followed by recovery; in other cases the eye was lost. Hernia of the iris may result in such cases, or the transparent cornea become hopelessly opaque. This affection of the eye is generally observed at an advanced period of the disease.

10. *Otitis*.—Less common than ophthalmia, we now and then do meet with cases of inflammation of the external meatus or internal ear, terminating by resolution most frequently, or in abscesses with severe suffering. It generally occurs towards the decline of the disease.

11. *Abscess*.—Subcutaneous abscesses are sufficiently frequent, and as the patients in whom they occur generally recover, they have been regarded by some writers as critical. In some cases they appear independently as the result of the violent inflammation which the skin has undergone, and in others they are probably connected with rheumatism. Rilliet and Barthez observe: "Besides these patients, six others had abscesses, more or less numerous, in different parts of the body, and particularly around the articulations. Two out of twelve or fifteen of these abscesses followed upon considerable swelling of the subcutaneous tissue. In fact the children had at this period severe pains, which diminished with the general swelling. But the local tumefaction continued, and soon after fluctuation became perceptible. In other cases the first evidence of suppuration between the thirteenth

and thirty-second day, was pain, accompanied by swelling, heat, and redness in some part of the body, and, when near an articulation, simulating very accurately articular rheumatism. However, in a few days suppuration was evidently established, and the abscess being opened, gave exit to pus, sometimes sanious, sometimes thick and healthy, and then cicatrization took place after a longer or shorter time. Two patients alone had a single abscess; the others had two, three, or four, in different parts of the body. We observed them on the chin, at the anterior iliac spine, in the parotid, but more frequently around the shoulder, the elbow, and the joints of the thigh or foot. In all cases except one, cicatrization was sufficiently speedy. Of the six patients, five recovered and one died.

12. *Rheumatism*.—The preceding paragraph will show that articular rheumatism occurs occasionally, though not very frequently. Rilliet and Barthez remark: "Four patients exhibited symptoms which resembled those of articular rheumatism, *i. e.*, tumefaction and pain about several joints, sometimes with redness. These symptoms were of short duration, and in two cases there was metastasis from one joint to another, although it is true that in one of these cases there was an interval of twenty-two days between the inflammation of the two joints." Of ten cases of arthritis, or of abscess, six had normal variola, three abnormal variola, and one varioloid. Of the entire, eight were cured; one died during suppuration; and another a long time after the disappearance of the rheumatism." "It is impossible, with such facts before us, not to regard these inflammations and abscesses towards the end of variola as a critical symptom of favorable augury."

13. *Eruptions*.—I have already mentioned the occurrence of petechiæ, resembling those of purpura hæmorrhagica, and of bullæ, both unfavorable symptoms, and occurring only in the worst kind of cases. Guersent and Blache mention having seen the favi of porrigo form upon the pustules of smallpox. Rayet, and Rilliet and Barthez, observed mercurial erythema follow the use of mercurial plasters. But, what is more remarkable, measles and scarlatina may occur, either along with smallpox, just previously, or immediately after. Sydenham mentions that the irregular black smallpox was introduced by an epidemic of measles, in 1670, and also the singular variety which appeared in 1674-5. Nay more, the vaccine vesicle may maturate coincidently with smallpox. In November, 1849, my son vaccinated an infant, and the vesicle rose well and matured, but about the sixth day an eruption appeared over the body which turned out to be smallpox, of which the child died. It is to be presumed that the child took the infection before vaccination. I have since seen a similar case myself; and Dr. Simpson has recently related two similar cases which proved fatal.

14. Other complications have been observed, but less frequently than those I have noticed. Anasarca occurs occasionally at the begin-

ning or during the desiccation; and œdema of the lung. Pleurisy and pericarditis have been sometimes observed, but neither of these is of frequent occurrence.

Pathology.—A *post-mortem* examination reveals considerable congestion of almost all the organs of the body. The muscles are of a deeper red colour than usual; the vessels of the brain and its membrane are distended; the lungs, liver, spleen, and kidneys, are more or less congested or inflamed. The blood is a good deal changed; it is almost entirely fluid, of a dark colour, and unusually serous; or, if there be coagula, they are small, soft, and of a dark colour.

From the eruption being more abundant where the cutaneous follicles abound, MM. Petzholdt, Rilliet and Barthez, regard them as the true seat of the pustules of smallpox. This pustule, at its origin, is but a macula resulting from the vascular injection of the mucous tissue of Malpighi. Shortly afterwards, the surface becomes raised, and a pustule is gradually formed; in its interior there is a circular false membrane which is attached by a threadlike process to the cutis on the one hand, and to the epidermis on the other, and this it is which causes the depressed centre of the pustules. Beneath this membrane there are small cells, containing a serous fluid, and without intercommunication. At a late period, when pus is formed, it penetrates between the epidermis and the membranous disk, ruptures the adhesions, and gives a globate form to the pustule, which has thenceforward only one sub-epidermic cell. If we divide a fully formed pustule, we may perceive at its base the pseudo-membranous disk, underneath which the cutis is red and often inflamed. Cotugno enumerates thus the tissues to be seen in a pustule divided vertically: 1. A white line formed by the thickened epidermis; 2. Beneath, a purulent layer; 3. Still lower, a red line, formed by the inflamed rete mucosum; 4. Underneath which is the unaltered chorion; 5. In the centre of the pustule a small white body, whose superior filiform extremity is implanted in the centre of the depression (umbilicus), whilst the inferior is attached to the inflamed corpus reticulare.

MM. Rilliet and Barthez do not agree with M. Rayer* as to the formation of the umbilical depression, because it exists when there is no membranous disk. They prefer M. Petzholdt's† explanation, who attributes it to the traction excited upon the epidermis by the excretory ducts of the cutaneous glands. They have thus stated the different degrees of suppuration in different parts of the body: 1. In the face, and sometimes on the limbs, the ulceration extends to the chorion more or less deeply, with a true suppuration, and followed by persistent cicatrices. 2. On the limbs most frequently, and sometimes on the face, there is inflammation of the sub-epidermic layer, with erosion

* Mal. de la Peau, vol. i. p. 529.

† Archives Gén de Méd., 1838, vol. ii. p. 314.

and suppuration, but no cicatrix. 3. If the cutis be not eroded, with inflammation of the sub-epidermic layer, there will be a serous secretion at first, then one of plastic lymph, but no cicatrix. 4. The serous secretion may be deficient, and then the false membranes will not be abundant, and the pustules will be flat, &c.*

The mucous membrane of the mouth, larynx, pharynx, and, in short, any portion possessing epithelium, is the seat of pustules, but which are modified in some degree by the peculiarities of the structure, and when the epithelium has been removed, exhibiting superficial ulcerations, which may be increased in extent by the junction of several. Pustules are also observed in the œsophagus, but not so frequently. It is a matter of dispute whether any true pustules have been found in the stomach. M. Guersent believes that he has seen them several times in the stomach and in the small and large intestines. M. Rostan† found them in the large intestines and in the rectum, and Cotugno‡ observed them upon the mucous membrane of a prolapsus ani. Rayer, and Rilliet and Barthez deny that they exist in the intestines, and attribute the appearance which has been mistaken for them to the development of the mucous follicles. Dr. Condie mentions that in the epidemic of 1823-4, at Philadelphia, in almost every case, the stomach and upper portion of the small intestines were diseased.

The larynx, trachea, and principal bronchial tubes exhibit the varicellous pustules upon their mucous membranes, and, in common with the gastro-intestinal surface, present appearances of congestion and inflammation.

Causes.—Among the predisposing causes are age, sex, and seasons. It occurs at all ages, nay even before birth§ as has been observed by Mead, Jenner,|| Laird, Hosack, Aulsebrook,¶ and others, and undoubtedly children are more subject to it than adults, and adults than old people. For a reason I have mentioned before, I attribute the predominance of the smallpox among young children to the fact of their taking it the first time they are exposed to the contagion, rather than to any greater susceptibility in children than in adults. Rilliet and Barthez have remarked that the anomalous variety is more common among young infants, and the normal form among older children. The disease is not so frequent apparently, among very young infants, as measles and scarlatina. It does not appear that the one sex is more liable to the disease than the other.

Smallpox, when it prevails epidemically, commences according to

* Mal. des Enfants, vol. ii. p. 453.

† Dict. de Méd., vol. xxi. p. 196.

‡ De Sede Variolarum, p. 152.

§ Graetzer, Krankheiten des Fœtus, p. 27.

|| Med.-Chir. Trans., 1809, p. 269.

¶ Lancet, Sept. 2, 1854.

Sydenham, about the vernal equinox, and is prolonged during summer and autumn, when the disease is mild and regular, but when it is irregular it appears sooner.*

The chief agent in the spread of variola is contagion or infection. No one doubts, I believe, that it is contagious, or that it may be conveyed to a distance, but how far the sphere of its contagion extends is not easy to determine. Dr. Williams has fixed from thirty to fifty feet. Dr. Gregory thinks that the contagious miasm is given off at every stage of the disease, "from the first invasion of fever to the throwing off of the latest scabs." That it may be conveyed in the air and by clothes is also admitted. In an interesting monograph, lately published, Dr. T. H. Buckler, of Baltimore, conceives that it may have been transmitted by means of the paper-money used in that city. From what I have already stated, it will be seen that the period of incubation is not precisely determined. It may not always be that it is not always precisely the same under similar circumstances, but, as far as we can judge, it is between four days and a fortnight generally.

There are two other modes by which it may be communicated: 1, through the blood of the mother to the foetus *in utero*, whether the mother have the disease or not, as in the cases related by Mauriceau, Mead, Watson, Forbes, &c.; and 2, by means of inoculation, which was common in China, India, Africa, Turkey, from whence it was imported by Lady M. W. Montague in 1721. It was introduced into America in the same year by the Rev. Cotton Mather. The disease thus produced is essentially smallpox in almost all cases; some few cases of varioloid occasionally result, but it is very much milder, not more than 1 in 500 are said to have died. This practice has, however, been superseded everywhere by the glorious discovery of Dr. Jenner.

The disease also prevails epidemically, and none have been more fatal. The desolating effects have been felt by the wild tribes of North America, some of whom it has obliterated, as well as the civilized inhabitants of Europe, whom it more than decimated in former days. It is not, however, easy to give a list even of the principal epidemics. Sydenham has left an admirable description of those which prevailed in 1671, 1672, 1674, 1677, 1678, and 1679 in London, where it was also epidemic in 1757, 1781, 1796, 1825, and 1838. The disease was introduced into America in 1527, and a severe epidemic occurred in 1633; others at Boston in 1649, 1666, 1678, and 1690. In 1702, 4.4 per cent. of the inhabitants died of it, and in 1721, 54.6 of the population had it, and 14.3 per cent. died, and it occurred in Philadelphia in 1823. An epidemic prevailed at Berghen, in Norway, 1749, and destroyed 528 persons. One occurred in Norwich in 1819, and destroyed 530 persons between May and October. An epidemic com-

* Works, by Wallis, vol. ii. p. 152.

menced in Sweden in 1824, reached England in 1825, spread in France in 1826-7, and terminated in Italy in 1828-9. In 1838 various towns and country districts of England suffered from this plague. Dr. Rogers has noticed a very fatal epidemic which prevailed in Cork in 1708, and its annual return to that city from 1718 to 1721, and from 1728 to 1731.* Dr. Ratty mentions severe epidemics in Dublin in 1728, 1736, 1740, 1743, 1745, and 1752; and it appears that the number of those who died of smallpox was little less than those who died of fever.† It prevailed here also in 1837, 1838, 1839, and 1840. Dr. Ringland has given an account of the latter.‡

Diagnosis.—Perhaps there is no disease whose diagnosis is more easy when it is fully formed. The intense fever, subsiding on the appearance of the eruption, the character of that eruption, rapidly running on from papulæ to vesicles and pustules, their confluent character, and the formation of the scabs, serve at once to distinguish it from any other eruptive fever. It is true that at a very early period we may be in doubt whether the child be about to have measles or smallpox, but a day or two will decide; and in some of the anomalous cases we may have to determine that it is smallpox, by proving that it can be neither measles nor scarlatina: but in general we shall find but little difficulty.

Prognosis.—Our prognosis must be founded upon the character of the disease. If it be discrete and normal, the majority of cases recover; when confluent, but normal, there is more danger, but still it is often cured; but when confluent, complicated, and abnormal, it proves very fatal. M. Rayer remarks: "The gravity of the prognosis is in proportion to the number of pustules, the degree of inflammation of the skin of the face and mucous membranes, and especially of that of the air-passages, the temporary or permanent character of the complications, the presence of the petechiæ, and the amount of passive hemorrhage. It is unfavorable in infants during dentition. "If the eruption is successive in confluent variola, the danger is in general less imminent; if, on the contrary, the pustules appear at once on the face, neck, trunk, and limbs, the disease is one of the most serious to which the human frame is liable, and death often terminates it. Variola, with cerebral symptoms at its commencement, or in its course, is very dangerous. Ecchymoses and petechiæ indicate often a fatal change in the blood, and approaching death. "Laryngo-tracheitis, croup, and pseudo-membranous bronchitis, render the prognosis more and more serious. Obstinate ophthalmia, otitis, cæco-colitis, abscess, or other affections, augment the danger during convalescence."§

* An Essay on Epidemic Diseases, 1734.

† On the Weather, Seasons, and prevailing Diseases of Dublin, 1770.

‡ Dublin Journal, July, 1841, vol. xix. p. 429.

§ Mal. de la Peau, vol. i. p. 539.

It has always been one of the most fatal diseases of children. Before the introduction of inoculation, the mortality was said to be 25 per cent. In London, before the discovery of vaccination, the deaths by smallpox were to the total deaths as 8 to 100; and in the last century 199,665 persons died of it. In Germany, Heim states the mortality to be 20 per cent. At the Smallpox Hospital, the average mortality for twenty-five years (from 1776 to 1800) was $32\frac{1}{2}$ per cent. From 1800 to 1825 it was 30 per cent. In Philadelphia, from 1786 to 1802, the average relative mortality was 1 in 14, or 7.28 per cent.; from 1807 to 1811, 4 per cent.; from 1816 to 1841, after the prohibition of inoculation, about 1.65 per cent. Throughout England and Wales the deaths now amount to about 12,000 annually, and Dr. Gregory considers that one in six of those attacked may be considered as the average mortality. In Dr. Geo. Kennedy's valuable report, I find that in Dublin the mortality is nearly one in five, taken generally, and of the confluent cases nearly the half died.* As might be expected, the younger the child the more fatal the disease. Of 3022 deaths of children from this cause in Philadelphia in forty years, 1810 occurred in those under ten years of age, and 555 under one year. Of 9762 who died in England in 1837-8, 7340 were under five years of age.

Treatment.—Fortunately in the present day we are rarely called upon to treat smallpox, compared with former times; but even now we occasionally meet with it, and our treatment must be regulated by the violence of the disease, the state of the patient's constitution, and the stage of the complaint. The old method of close hot rooms, warm clothing, and hot drinks, may be considered as abolished since the time of Sydenham; experience having shown that cool, well-ventilated apartments, comfortably cool bedclothes, and cooling drinks, are much more pleasant and successful.

As we cannot prevent the disease from running its course, our aim must be to mitigate such symptoms in each stage as may threaten to become dangerous. During the stage of incubation we can do little or nothing beyond having recourse to the ordinary hygienic rules, but during the second stage we may endeavour to moderate the febrile excitement. When we have any reason to suspect the patient of having taken smallpox, if the fever be moderate there is little to be done beyond confinement to bed, cool drinks, and a dose or two of purgative medicine. But, suppose the fever to be intense, are we to resort to bloodletting? Not for that simply, it would appear. At the commencement an emetic, afterwards purgatives and cool drinks, with low diet, will answer the purpose, unless some complication should declare itself. If there be evidences of much cerebral excitement, of pulmonary, or gastro-enteric inflammation, &c., and especially if the type of the epidemic be inflammatory rather than typhoid, we

* Report of Cork-street Fever Hosp., Dublin Journal, 1844-5, p. 45.

must have recourse to bleeding from the arm, or the application of leeches. For this we have the sanction of the highest authority, though others have objected. Dr. Gregory remarks: "I can give you no rules as to the quantity of blood to be drawn. Consider the circumstances of each case, and be guided by them. Your object is to unload and relieve the lungs, the liver, or the brain. Whenever, therefore, these organs are gorged and their functions impeded by a load of stagnant or inflamed blood — when intense headache, extreme irritability of the stomach, oppressed breathing, with a full, laboring pulse, give evidence of such general or local congestion; draw blood, and let the quantity drawn be such as to relieve the urgent symptoms. In some cases, when headache predominates, with suffusion of the eyes, leeches applied to the temples afford all the relief which is required to take off the strain from the vessels."*

Saline effervescing draughts, small doses of James's powder, &c., by promoting the cutaneous secretion, will moderate the heat of the skin. Nitrate of potash has been recommended as a refrigerant by Henke and others. Lemonade made with cream of tartar is a pleasant beverage; and both these salts act upon the kidneys beneficially. We must take care, however, not to carry the cooling regimen to excess, or the patient may be attacked by some organic disease; and in giving acid drinks we must have consideration for the state of the bowels.

Dr. Condie recommends that the hair should be cut short, not merely as a matter of cleanliness, which it will promote, but as diminishing the tendency to cellular inflammation of the scalp, sore eyes, &c.

If there be much soreness of the mouth and fauces, an acidulated gargle will be useful; if the child be too young, we must use honey with a slight proportion of borax, or sponge the mouth with an acidulated lotion.

As soon as the eruption appears the fever generally subsides, and if there be no complication, we shall scarcely need to interfere beyond assuring ourselves of the state of the bowels, continuing the antiphlogistic regimen, and guarding against cold. If there be any organic disturbance or inflammation, then our treatment must be carefully directed for its relief, with such modifications as the presence of so severe an eruptive disease may impose. During the stage of maturation or suppuration, if the disease be mild and discrete, there will be little for us to do. The cold drinks may be continued, and some slight stimulant allowed if the patient be weak, such as wine whey, or weak wine and water. Gargles will still be necessary in most cases, or a linctus if the infant be young. Small doses of camphor or ammonia are sometimes beneficial; and in consequence of the irritation and restlessness produced by such an extent of

* On Eruptive Fevers, p. 83.

suppurating surface, it may be advisable to give an anodyne, so as to quiet the nervous system and procure sleep. From the relief afforded by a critical diarrhœa we are advised to the liberal use of purgatives at this period.

In severe cases of confluent smallpox, where the fever assumes a typhoid type, stimulants must be freely given during this stage. Wine or brandy, chicken-broth or beef-tea, must be given according to circumstances, and in such quantities as the case may demand. Camphor, ammonia, musk, &c., may also be administered with benefit.

In petechial or hemorrhagic cases vegetable or mineral acids have been recommended, as sulphuric, chloric, hydrochloric, and lemon-juice, either alone or in combination with quinine. Dr. Gregory thinks that these cases admit of no essential relief from medicine.

The complications which are so apt to arise at this period will require great watchfulness to detect them, and great skill in the adaptation of the suitable treatment which I have heretofore detailed. We must have regard not merely to the organ affected and the intensity of the attack, but to the present condition of the child, and the probable course of the disease. The tumefaction of the face and state of the eyes will require great attention. Fomentations of warm water, decoction of poppy heads, or the vapor of warm water, will be very soothing. If the eyelids are closed, in addition to bathing them carefully and frequently, warm water should be thrown into them by means of a syringe, so as to cleanse them from the discharge. Acetate of lead dissolved in water or a decoction of poppy heads is a very nice application, provided there be no ulceration of the cornea; if there be it will leave a white spot, which nothing will remove. On this account it should not be employed unless we can ascertain the state of the cornea. In order to prevent the face from being marked, it has been proposed by Velpeau and Meyrick to touch the pustules with nitrate of silver after removing the epidermis; and Rilliet and Barthéz state that, though painful, it is effectual in preventing cicatrices. MM. Serres and Oliffe propose to pencil the eruption with a strong solution of nitrate of silver (gr. xv. to gr. xlv. to the ounce) before it assumes the pustular form. Medavaine employed frictions with sulphur ointment; Dr. Stewardson and others the application of mercurial ointment, and keeping the patient in a dark room. Of the latter Dr. Condie and Dr. West speak favorably. Dr. Crawford of Montreal, and Dr. Jackson of U. S. America, state that they have obtained favorable results from pencilling the eruption with tincture of iodine.

During the stage of desiccation, after the secondary fever has subsided, it will be necessary to support the strength by a gradually improving diet, wine tonics, &c. Much care must be taken that the patient shall not take cold, or by imprudence expose himself to the secondary affections which come on at this time. A warm bath, repeated twice a week, will be of use not merely in cleansing the

surface and in allaying the itching, but in so restoring the skin to its natural condition that the troublesome rheumatic affections and abscesses may be prevented. As the itching at this period is very troublesome, we must adopt some means to relieve it, and to restrain the child from adding to the disfigurement by scratching or picking itself. Cold cream, oil, or spermaceti, are recommended; but the best remedies I know are zinc cream, the black wash, or a decoction of poppy heads with sugar of lead.

The only prophylactic treatment is either inoculation or vaccination: the former is prohibited by law in these countries, as it would be a foolish risk where a better and safer remedy is at our command. I have, therefore, not entered into the subject; but those who are anxious for information will find sufficient in a collection of pieces on the subject published in 1768, in Dublin, or in Dr. Thompson's work on smallpox.

CHAPTER V.

VACCINIA. COWPOX.

IF he who "makes two blades of grass grow where one grew before" be a benefactor to mankind, what shall we say of him whose genius has stayed one of the most desolating plagues of mankind, who has been the means of saving millions of human lives, who has contributed to the preservation of families, who has enlarged and rendered more secure the social circle, who has given permanency to holy ties, who has multiplied the manhood of nations, and added to their true wealth and strength? It is trifling with realities to talk of the glory which involves destruction, in presence of this greater glory of preservation. In the long list of earth's benefactors, very few, if any, will take precedence of Edward Jenner, when the true importance of things is clearly discerned.

After having learned in the last chapter the frequency and destructive extent of the epidemics of smallpox, its proportionate and absolute mortality, we are well prepared for appreciating the value of the remedy now to be considered. It appears that in certain districts of dairy farms it had been observed that the cows were subject to an eruption

upon the teats, and that the hands of the milkers frequently took the eruption from these cows—were inoculated in fact. Those who did so regarded themselves as secure from the smallpox, and I believe were so. But although this fact was open to the investigation of every one, nay, though it had been pressed upon the notice of the provincial medical men, they could or would see nothing in it.

In the year 1770, when Dr. Jenner went to study in London, he mentioned this popular opinion to John Hunter; and on his return to Berkeley, in Gloucestershire, he applied himself to the investigation of its truth or falsehood. Nothing can be more interesting and instructive than the record of his labours; the patient, unwearied industry, the energy in overcoming obstacles, the acuteness in distinguishing differences, the candour, and honesty, and strength of mind in dealing with opponents, all convey a lesson by which we may well profit, and the relation of which I should gladly undertake, for the benefit of my junior readers, if I had space and time. As it is, I must content myself by saying, that having satisfied himself of the truth of the popular opinion, he conceived the grand idea of propagating the cowpox by inoculation, as a preventative of smallpox. This was about 1780, and he continued his enquiries yet sixteen years longer before he made his first experiment. On the 17th of May, 1796, a boy was vaccinated, and tested with smallpox on the 1st of July the same year, and found unsusceptible. This was the hour of triumph for Jenner, and the reward of nearly thirty years' labour. The rest of his life was spent in furthering the spread of vaccination by his personal influence, writings, &c.; and he sunk to rest with the consciousness of having been made a blessing to all mankind.

I shall not enter into any detail as to the subsequent history of vaccination, the objections that were made, the obstacles that were raised, nor in the successful efforts of its advocates and friends. It is sufficient to know, as all do now, that it did triumph, that it has spread from nation to nation throughout the civilized world, and that it has in these countries the sanction of law; for, by an Act of Parliament passed in 1840, propagating smallpox by inoculation is prohibited and vaccination prescribed to all.

Dr. Gregory thus describes the regular course of cowpox: "On the third day from the insertion of the virus, the wound will be perceived red and elevated. By aid of the microscope, the efflorescence surrounding the inflamed point will be distinctly perceived, even on the second day. On the fifth day the cuticle is elevated into a pearl colored vesicle, containing a thin and perfectly transparent fluid in a minute quantity. The shape of the vesicle is circular or oval, according to the mode of making the incision. On the eighth day the vesicle is in its greatest perfection; its margin is turgid and sensibly elevated above the surrounding skin. In color the vesicle may be yellowish or pearly. The quantity of fluid which it contains will be found to vary very much. When closely examined, the vesicle will exhibit a cellu-

lated structure. The cells are eight or ten in number, by which the specific matter of the disease is secreted. The vesicle possesses the umbilicated form belonging to variola. On the evening of the eighth day (counting from the day on which the incision was made) an inflammatory circle or areola commences at the base of the vesicle. The skin becomes tense, red, and painful, for a considerable extent around. The figure of the areola is perfectly circular. In some cases the subjacent cellular membrane participates in the inflammatory action, and occasionally the glands of the axilla swell. The areola continues to advance during the ninth and tenth days. On the eleventh day it begins to fade, leaving in its decline two or three concentric circles of a bluish tinge. The vesicle by this time has either burst spontaneously or been opened by the lancet of the surgeon. Its contents now become opaque. The vesicle itself begins to dry up, and a scab forms of a circular shape, and a brown or mahogany colour. By degrees this hardens and blackens, and at length, between the eighteenth and twenty-first day, drops off, leaving behind it a cicatrix of a form and size proportioned to the prior inflammation. A perfect vaccine scar should be of small size, circular, and marked with radiations and indentations. These show the character of the primary inflammation, and attest that it had not proceeded beyond the desirable degree of intensity. Many of the perfect scars disappear entirely as life advances."* There is very little constitutional disturbance attendant upon vaccination; occasionally, after the seventh or eighth day, the child becomes restless, uneasy, and feverish, with loss of rest and diminished appetite. This disappears after lasting for a few days. Now and then we see a child suffer during the entire course of the disease; and on the other hand, many children go through it with no fever at all.

Modifications and Irregularities.—Let us first notice those cases in which their deviations do not impeach the validity of the vaccination.

1. The vaccine vesicle may be tardy in its appearance; in some cases it shows no appearance until the sixth or eighth day, and then runs through its course; in other cases the delay seems to be in the maturation; the inflamed spot appears at the proper time, but the vesicle is not complete until the tenth or twelfth day, or even longer. Dr. Labatt has met cases where no inflammation occurred till the twelfth day; Mr. Bryce, others deferred a fortnight; Mr. Pearson, one case, where it did not appear for twenty days; Mr. Ring, in one instance, saw no appearance before the forty-sixth day. We can understand that a co-existing disease, such as measles, scarlatina, diarrhœa, &c., may modify the course of vaccinia; but in many cases no such cause exists, and it is quite impossible to explain the delay.

* On Eruptive Fevers, p. 189.

2. In some cases, on the first appearance of the vesicle, it gets rubbed, or the child scratches off the head, and the character of the vesicle is changed. It loses its proper form and is more conoidal; its contents, too, are rather thicker and more yellow than usual, and it has more the appearance of a pustule. There is an areola round the base, and the scab is small and drops off prematurely. "When all the previous appearances have been well marked, it will occasionally happen that at the desiccating period pus shall be formed." "When any pus is formed, it is probably the effect of local irritation. If the crust be torn off, or mechanically injured, an ulcer is often found, which frequently, especially in scrofulous constitutions, proves difficult of cure."*

3. In other cases the inflammation is very intense; the areola occupies two or three times its usual extent, is of a deep red color, and resembles erysipelas. The vesicle, instead of drying, is converted into an ulcer, involving the entire thickness of the cutis, and leaving behind a deep pit, as large as a sixpence or shilling. In these cases the suffering is considerable, and the fever sometimes runs very high. I have noticed this occurrence particularly in children beyond ten years of age, and young persons, and I attribute it to rubbing during sleep for the relief of the itchiness. Dr. Labatt mentions that he has met with cases of diffuse inflammation following vaccination; and Dr. Osbrey has given two cases of a very formidable character, the arm swollen and inflamed, the vesicle turned into a dark slough with the surrounding parts livid and apparently gangrenous, great fever in one case and stupor in the other.†

4. During the course of the vaccine vesicle, we may sometimes observe a lichenoid eruption on the child's body, with crops of vesicles here and there. It apparently arises from the peculiar irritability of the skin in some infants, and it may occasion uneasiness to the parents, for which, however, there is no ground. Dr. Labatt has referred to several similar examples.

There are other deviations from the normal course of vaccinia, which are either unsatisfactory or quite inefficacious.

1. The same vaccine virus may succeed with one child and fail with another, without any appreciable cause. Many children require to be vaccinated several times before we succeed; others, though rarely, resist every attempt. Mr. Bryce vaccinated a child ten times and failed; Mr. Elkington was himself inoculated for smallpox four times, and three times for cowpox, but in vain. I have vaccinated children seven times before the infection took; and in obstinate cases I allow a considerable interval to elapse before repeating the vaccination. In

* Labatt on Cowpox, p. 83.

† Dublin Journal, vol. xxv. p. 137.

other cases, doubtless, the failure may be accounted for either because the lymph has been taken from a spurious vesicle, or at too late a period, or upon a rusty lancet, or it has been injured by heat, exposure, or moisture, or on account of some coincident disease.

2. Occasionally we find the inflamed spot on the third or fourth day as it ought to be in appearance, but instead of progressing in the usual manner, a small acuminated vesicle forms, without or with very slight areola, and soon dries up in a minute scab, which falls off in a day or two.

3. Sometimes the insertion of vaccine lymph is followed by a slight inflammation, gradually increasing to the fifth or sixth day, when a pustule is formed containing opaque matter. Every now and then the inoculated part proceeds regularly for a few days, when a watery discharge takes place, followed by a crustaceous sore; and about the eleventh day the part is usually covered by a dark-coloured crust. I should distrust such cases.

4. Dr. Labatt has laid down the characters of spurious cowpox so succinctly, that I cannot do better than quote them: "There are two kinds of spurious vesicles, the *first* bears a strong resemblance to the true in several respects; its edges are commonly elevated, its contents nearly limpid, and it continues the usual time; but it commences with a creeping scab, of a pale brown, or amber colour, making a long, slow progress, sometimes unattended by any efflorescence; the vesicle is more transparent, and the pellicle is generally thinner and easily torn. This Dr. Jenner has particularly noticed, and he ascribes it to the virus used for inoculation having been exposed to a degree of heat capable of decomposing it. The *second* kind appears early and increases rapidly; is elevated in the centre, and globular, with more or less of the appearance of a common phlegmon; and when punctured, there issues opaque fluid, resembling what is produced in any other festering sore. It is more easily ruptured; at the sixth or seventh day it generally runs into a perfectly purulent state. The areola is irregular or notched, resembling a large blotch; has a fiery or livid aspect; is not shaded off into the surrounding skin; and, as Dr. Cappe observes, seems rather to be under than upon its surface, while, at the same time, it is less extensive, nor is the hardness around it so evident. A ragged scab prematurely covers the vesicle, or, when the black crust should form, a yellowish sore appears, drying and breaking out again, with an oozing from under it. Imperfect vesicles are, in general, smaller and more globular than the true vaccinia; they have not the turgid, convex margin, but a somewhat puckered base, appearing to slope off into the surrounding skin; they have not a cellular structure; contents not clear, transparent lymph, but a straw-colored, opaque, or purulent fluid; the areola not defined, nor of so vivid a rose tint, but ragged and diffuse, appearing about the seventh or eighth day, or earlier, on the fifth or sixth, of a dark red colour, with less hardness than the

true areola, and disappearing sooner; the succeeding crust is smaller, of a light brown or amber colour, irregular, and friable, forms earlier, separates sooner, and leaves an indistinct and not pitted cicatrix.”*

5. Smallpox and cowpox may sometimes exist together, without any sensible modification of either, or they may each restrain or modify the other. If the variola have preceded the vaccinia, and the fever be high, the latter will generally be, as it were, blighted.

In an enormous majority of cases, the vaccine vesicle not only runs its proper course, but vaccination is successful, and the child is protected against the smallpox. We have seen that the practice of inoculation was attended by a greatly diminished mortality, but not to be compared with the immunity conferred by vaccination. Notwithstanding the prevalence of natural smallpox and (until lately) of inoculation, it has been found that the mortality has gone on diminishing since the time of Jenner; and it is hardly too much to attribute, with Dr. Monro, the great increase of the population which took place between 1801 and 1811, compared with the previous ratio, to the lives saved by vaccination. It has, however, been supposed that its protective power may be exhausted in time, and certainly there is this much evidence in favor of this opinion, that in a number of cases where a genuine vesicle was formed in childhood, smallpox or varioloid has occurred in after life. Whether the number of such cases is increasing I cannot say, but for many years they were not numerous. In the Report of the College of Surgeons it is stated that of 164,381 persons vaccinated by members, only 56, or about 1 in 300, were afterwards affected with smallpox.† Dr. Monro thinks that such cases are more frequent than here stated. In Dr. Baron's Report I find that, between 1825 and 1832, 86,646 patients were vaccinated at the National Vaccine Establishment, and of that number only two deaths from smallpox after vaccination are mentioned. Dodd reports 201 cases of smallpox in the year 1837, of which 114 were after reported vaccination; 91 cases were mild, 23 severe, and 2 fatal. At the Royal Military Asylum, Chelsea, between 1803 and 1833, of 2533 who had smallpox before admission, 26 had smallpox again, and 3 died; of 3688 who were vaccinated before or after admission, 27 caught smallpox, and none died.

It is to meet such cases that certain persons have recommended re-vaccination after the interval of a number of years, or periodically every seven years. In Prussia several extensive re-vaccinations have been practised, and even among those who took it, some few cases of smallpox occurred. The late Dr. Labatt, whose high standing and experience all will admit, objects to these re-vaccinations as being

* Labatt on Cowpox, p. 90.

† Monro on Smallpox, p. 147.

unnecessary, considering the small proportion of variola after vaccination, and also as not being valid as a test of the former vaccination, or as a safeguard for the future. During the winter of 1849-50, smallpox was epidemic in Dublin, and most of us witnessed cases of persons taking it, in whom vaccination had been successfully performed during infancy. I met with several such cases, but I did not meet with a single such case, nor had those professional brethren whom I consulted, under 16 years of age. So far as this goes, it is an evidence undoubtedly for the exhaustion of the protective effects of the virus after a certain time, and an argument for re-vaccination.

There are some questions relating to re-vaccination which deserve a further investigation. Of those re-vaccinated, a large number succeed well—is it certain that they were previously obnoxious to smallpox? A certain number take it in a modified form; is that because of their previous vaccination? and are we to infer their security from smallpox? Is there any doubt about their security with whom re-vaccination fails altogether?

The late Dr. Fisher, of Boston, who had devoted much attention to this subject, arrived at the following conclusions from extensive statistical researches:—1. "That one single and perfect vaccination does not for all time and in all cases deprive the system of its susceptibility of variolous disease. 2. That one or more re-vaccinations *do*; and that consequently a physician should recommend re-vaccination, when questioned as to its necessity."* Or, entering more fully into the question, he concludes that, "1. A portion of vaccinated persons are protected from smallpox through life by one vaccination. 2. An indefinite number are protected only for a certain period of time. 3. The length of time they are thus protected is undetermined. 4. Some individuals require to be vaccinated a number of times during life. 5. The system is protected from variolous contagion when it is no longer susceptible of vaccine influence, as tested by re-vaccination. 6. The cowpox virus does not seem to be more efficacious than the human vaccine virus in its prophylactic virtues, and the influence of the vaccine virus does not seem to be diminished by the number of its removes from the cow or passages through the human system. 7. The appearances of vaccine cicatrices furnish no indication that the system may or may not be again influenced by repeated vaccinations. 8. A plurality of vesicles have no more effect in rendering the system less obnoxious to the influence of re-vaccination than a single vesicle has. 9. The lapse of time from the period of primary vaccination to that of re-vaccination has some, though but little effect in preparing the system to be further influenced by the vaccine virus. 10. The age of puberty tends in a degree to destroy the effect of primary vaccination. 11. The virus contained in vesicles resulting from re-vaccination has the

* Trans. of the American Med. Association, vol. iii. p. 73.

same anti-vaccine and anti-variolous power as that which is the product of vesicles produced by the primary vaccination." I may also refer my readers to Dr. Alex. Knox's valuable papers* and the conclusions elaborated by M. Craninx,† for the result of their observations in favor of vaccination and re-vaccination, as well as to the elaborate report published by the General Board of Health while these sheets were at press.

But granting that a certain number of such cases occur, or even supposing them far more numerous than they are, they ought not to shake our confidence in vaccination, considering the millions who pass through life with perfect immunity from smallpox; nor would it prove that even in those cases vaccination was of no use, for these exceptional cases seldom or never take the genuine variola, but that modified form of it which is called varioloid—an infinitely milder disease, and one almost never involving either danger or disfigurement.

There is still a very interesting question remaining, viz: what is cowpox, and what relation does it bear to smallpox? Are they simply different and incompatible diseases; or is the one a substitute for the other, having some relation; or are they modifications of the same disease and identical in nature? Dr. Jenner thought the latter, and further experiments have confirmed his opinion. A disease resembling variola prevails among animals during epidemics of smallpox; this can be communicated from one animal to another by inoculation, and be thus rendered milder, that it may be communicated to human beings, producing a mild disease. On the other hand, human smallpox may be communicated to the cow by inoculation, producing a mild form of the disease; and if matter be taken from those pustules, and a human being inoculated thereby, a disease identical with cowpox will result: "thus irresistibly proving," as Dr. Baron observes, "Dr. Jenner's fundamental proposition, that cowpox and smallpox are not *bonâ fide* dissimilar, but identical, and that the vaccine disease is not the preventive of smallpox but the smallpox itself; the virulent and contagious disease being a malignant variety."

Diagnosis.—The characters of a true vaccine vesicle, are, that it begins to appear on the third or fourth day after the insertion of the virus; that it increases for three or four days more, until on the eighth day it is round or slightly oval, depressed in the centre (like a pustule), with elevated edges, and containing clear, transparent lymph, which becomes afterwards opaque; that it has a well-marked areola; and that a brown circular scab forms and falls off, leaving a circular depression. Dr. Labatt remarks: "I have seen the areola very faint, but seldom entirely absent, nor should I be satisfied with any case unattended with areola and the normal circumscribed hardness, which I consider indica-

* London Journal of Medicine, Dec. 1850.

† Gazette Méd. of Paris, No. 27.

tive of constitutional vaccine affection; and *I know of no other certain proof of perfect vaccination.*"*

Mr. Bryce, in 1802, proposed a test of the validity of vaccination, founded on the fact that when fresh vaccine virus is re-inserted on the fourth, fifth, or sixth day from the first vaccination, but not later, the vesicles of the second form rapidly, and are hurried forward in their course, so as to overtake the first, and to maturate and scab at the same time. This plan was very popular at first, but seems now to have fallen into disuse. Dr. Labatt, however, is quite in favor of this test. He says: "When correctly conducted, it will, in my opinion, give every security against future attacks of smallpox which it is in the power of vaccination to afford; but if the second inoculation be postponed beyond the sixth or beginning of the seventh day, in the ordinary course of the affection, the characteristic test will not be obtained," &c. Dr. Gregory thinks that if there be any doubt of the perfect success of the first vaccination, it is better to repeat it after an interval of months or years.

Mode of operating.—Before proceeding to the actual operation, let me say a word about the lymph, and the best method of selecting it.

1. First, then, we should be very particular in taking the matter from healthy children only. It is a popular belief that various diseases and certain morbid conditions of the body may be transmitted through the medium of vaccine lymph, and although I do not believe this, yet I would never outrage a prejudice of the kind. Healthy children are sufficiently common, and it is a satisfactory assurance to a parent that she has no injury to fear from this source for her child.

2. The day on which lymph is ordinarily taken is the eighth, but it may be taken earlier and used successfully, and it will answer at a later period. Even the scabs, when powdered and dissolved in water, will succeed, but they are not so certain. Dr. Gregory's experience is thus stated: "The younger the lymph is the greater its intensity. The lymph of a fifth day vesicle, when it can be obtained, never fails. It is, however, equally powerful up to the eighth day, at which time it is also most abundant. After the formation of areola, the true specific matter of cowpox becomes mixed with variable proportions of serum, the result of common inflammation, and diluted lymph is always less efficacious than concentrated virus. After the tenth day the lymph becomes mucilaginous and scarcely fluid, in which state it is not at all to be depended on. Out of a dozen incisions made with such viscid lymph, not more than one will prove effective. The scabs of cowpox ground to powder, and moistened with lukewarm water to the consistence of mucus, will sometimes reproduce the disease in all its purity."† But the lymph may vary in purity in different persons at the same period; every vesicle does not necessarily contain

* On the Cowpox, p. 81.

† On Eruptive Fevers, p. 195.

equally efficacious lymph. It is more effectual from infants than from adults, and from primary than from secondary vaccinations.

3. The usual methods of conveying the lymph are on the point of a lancet, on small-pointed slips of ivory or quill, or on small squares of glass. The first is undoubtedly the best, but it is even better when we have it in our power to vaccinate one child direct from the arm of another.

4. The incisions are to be made with the point of a lancet inserted into the skin, or a few scratches made upon the surface. Blood must be drawn, but too much is inconvenient, as it dilutes the lymph, and is apt to run down the arm.

As to the number of vesicles to be raised, different opinions have been held. At an early period one vesicle was considered sufficient; then three, four, or six were recommended. Some of the Germans insist on twenty or thirty, as they hold that no reliance can be placed upon the vaccination unless some constitutional effect be produced. Dr. Gregory advises that five vesicles should be produced. In this country it is, I believe, the custom generally to make two punctures, nor is it found less effectual than five. For some years I have only made one, on account of the severe inflammation which sometimes results from two or more, nor have I had any reason to suppose that my object was not as completely attained.

CHAPTER VI.

OEDEMA OF THE CELLULAR TISSUE. SCLEREMA.*

THE disease of which I propose now to treat, œdema of the cellular tissue, cannot fairly be classed among the diseases of the skin; but, as no other place in the volume is more suited for it, I have ventured to insert it here.

The name given to it in this country is "hide-bound, or skin-bound

* By some mistake, too late to be corrected, this chapter has been placed here instead of immediately after the diseases of the skin.

disease," and most frequently by French writers, "induration of the cellular tissue;" but, as this is quite incorrect, I have adopted the one which expresses correctly its nature, and which is preferred by Billard and Valleix. It is a disease rare in these countries, and still more rare in private practice, but not uncommon in the foundling hospitals on the continent, and consequently it is to the researches of continental physicians that we are indebted for the most accurate account of the disease. From the year 1808 to 1811, 645 cases occurred in the Hospice des Enfants Trouvés at Paris, and in the year 1826, 240 cases. On an average, 1 in every 25 infants admitted are attacked by the disease a few days after birth, and not more than 12 in 100 recover. From the year 1828 to 1851, 53 cases occurred in the Lying-in-Hospital at Stuttgart, 10 being born at the full term of gestation, and 43 prematurely. The disease prevailed most extensively in the years 1849-50, during which time puerperal fever was epidemic in the hospital.*

Symptoms.—The attack commences shortly after birth, generally from the first to the fifth day, and it shows itself sometimes by a livid redness over the body, or by a circumscribed hard spot on one of the lower extremities, over which it spreads, and gradually ascends to the trunk, and from thence to the arms and face. The anterior part of the chest and the back are generally affected the last. The side on which the disease commences is generally more swollen than the other. That the swollen parts pit on pressure, there can be no doubt; but when the distension is extreme, a strong pressure of the finger may be required, and, when slight, the indentation soon disappears. This may have given rise to the opinion of MM. Auvity, Blanche, and Denis, that the tissues do not preserve the impression of the finger.

According as the cellular tissue becomes infiltrated, the limb or the trunk swells, and acquires a firm or hard feel, as though the entire tissues were indurated, and at the same time the temperature diminishes very considerably. M. Roger says that the coldness even precedes the swelling. M. Valleix met with but one exception: most frequently the coldness commences in the lower extremities, but sometimes in the abdomen. In the last stage of the disease, the entire body is so cold as to be unpleasant to the touch. It is extremely difficult to warm the patient, and, if we succeed, the body rapidly loses its heat. After a short time a change takes place in the color of the surface; the lividity diminishes gradually, and is succeeded by a yellow tinge, especially in the face, which deepens towards the termination of the disease, and around the mouth is mixed, as it were, with a livid tinge. The feet ordinarily, and sometimes the hands, preserve their reddish-blue color. Until the effusion becomes considerable, the skin is quite movable, and can be gathered into folds, but of

* Archives Gén. de Méd., May, 1853, p. 539.

course this looseness is by degrees lost, and at length the whole of the tissues seem solidified together, which led Underwood to suppose that the skin was as it were adherent to the bone.

The general state of the child is one of great weakness, its sensibilities are all diminished, its eyelids are almost always closed, and in the more serious cases, it will lie in a stupid, half insensible state, and die without a sign. When disturbed much, it is uneasy, and makes some efforts with its limbs, and if distressed it will cry, and the voice is quite peculiar; it is sharp, broken, and very feeble, often stifled or muffled. M. Auvity was right in saying that a physician who once heard will always recognize it. But this character is noticeable only at first; by degrees the cry becomes stronger, deeper, and at length resembles that of healthy infants. In very slight cases, the voice is but little changed, but only in one serious case did M. Valleix find it pure in tone, and pretty strong. It has been supposed that this peculiarity of voice arises from œdema of the glottis, and of the chordæ vocales, but this is sufficiently disproved by the fact that M. Valleix only met one case in which the chordæ vocales were œdematous. He considers that it depends upon the difficulty, feebleness, and incompleteness of the respiration.

M. Dugès, and others, mention the occurrence of spasmodic movements, and even of trismus and opisthotonos. M. Leger denies their existence, and MM. Blanche and Elsässer* mention having observed a degree of agitation of the limbs, but not in the least resembling convulsions. However, as M. Auvity found in some cases, a degree of effusion in the arachnoid, it is possible that convulsive movements may occur, although they are not dependent upon the affection of the cellular tissue. M. Valleix mentions that he never saw either convulsions or tetanus; when much disturbed, the child made efforts at flexion of the limbs. He never saw the rigid, stiff condition stated by M. Dugès, in which the child could be raised like a log, by the head or the feet.

The state of the respiration is peculiar. M. Blanche mentions its being rapid,† but M. Valleix found it, on the contrary, much slower than usual; inspiration is sudden and short, so that the chest is incompletely dilated, but expiration is very gradual, so that the interval between the inspirations is considerable. If the child be stripped, the abdominal movements will be found to be very slight, in some cases scarcely perceptible if the child do not cry, and now and then we observe a great effort at inspiration, after which the parietes of the chest resume their immobility. In one case, M. Valleix found an interval of from 10 to 12 seconds between the inspirations, and in four

* Arch. Gén. de Méd., May, 1853, p. 542.

† Essai sur l'endurcissement du tissu cellulaire, chez les nouveaux-nés, Thèse, 1834.

others 16 or 18 inspirations only in the minute. "In 18 cases whose bodies were subsequently examined, there was dulness on percussion in two from the beginning, in one on the left side, below and behind; in the other on the right side, above and behind. Three times dulness came on in the course of the disease, in two on the right side and in one on the left. In the first cases, the dulness resulted from non-dilatation of the lung; in the latter from congestion and induration. In the latter cases, pneumonia was much more frequent, since it occurred in four out of six cases; it was always characterized by cough, dyspnoea, and dulness, the bronchial souffle and bronchophony were heard but three times. These symptoms appeared in one case at the same time as the œdema, but in all the others at least two or three days after the commencement."*

The pulse is generally slower than usual, from 60 to 72, or about 80; according to Elsässer, so weak and small as scarcely to be felt; indeed, if the œdema be considerable, that combined with the extreme weakness will probably render it impossible to count the pulsations. The heart's action is weak also, but generally more distinct than the arterial. The digestive system seems to partake of the general torpor, the child shows little or no wish for either food or drink; the belly is soft, in some cases distended, but without pain or tenderness; the bowels are generally confined; M. Valleix met only one case of diarrhœa. Towards the termination, a sero-sanguineous fluid escapes from the mouth, as has been remarked by MM. Auvity, Leger, and Valleix, which probably M. Denis mistook for vomiting, which rarely or never occurs.

The disease lasts from two to six or eight days. In M. Elsässer's cases it terminated on the 1st, 2nd, or 3rd day, in one case, on the 4th day, and very rarely on the 10th or 20th day.

Most of these symptoms are present from the beginning, but in a slight degree, and, by degrees, they become more marked as the œdema increases. The sleep becomes stupor, the respiration slower, the circulation more feeble, the cry more stifled, the cold greater and more universal. When this state is extreme, the sero-sanguineous fluid escapes by the mouth, nose, and sometimes from the eyelids, and death takes place calmly, without agitation or convulsions. But all cases are not fatal, and in those which have a more favorable termination we find the respiration become easier, the circulation stronger, and the infant makes an effort to awake, to open its eyes, to drink or to suck eagerly. These efforts are repeated from time to time, and each time more successfully; the cry has more strength, and we can perceive the œdema diminish, at first from the eyelids and forearms, then the thighs and hypogastrium, then the hands. The legs and feet often retain the swelling long after the other parts have resumed their natu-

* Clinique des Mal. des Enfants, p. 618.

ral appearance. For some time the skin hangs loose and retains a bluish tinge, but by degrees this disappears.

Pathology.—A series of careful pathological researches have corrected several errors in the earlier opinions concerning this affection. To M. Billard we are indebted for a knowledge of the fact that the cellular tissue in this disease is not indurated or indeed changed at all, but that the hardness is entirely owing to the distension by fluid, and that the two are in exact proportion.* He has shown, however, that there is such a disease as induration of the adipose tissue, occurring just before death, with which sclerema may easily be confounded, and this is his description of it. "It may exist with or without general infiltration of the subcutaneous cellular tissue; the jaws, the thighs, the calves, and the back are the most common seats of this induration, and it may occur with or without disturbance of the respiration and circulation. It ordinarily comes on just before death, or it may be developed after death in infants who have been rapidly cut off. If the adipose tissue be dissected in these cases, it will be found firm, hard, like suet or tallow, quite coagulated, resembling the fat of slain animals." This really answers very closely to the description of "skin bound," given by Denman,† but no such condition is observed in the cases of œdema of the cellular tissue, which is a different disease.

Again, M. Breschet considered that there was something peculiar in this œdema of infants, in which it differs from that of adults, and he requested M. Chevreul to analyze carefully the serosity infiltrated. He states that he found the blood to be in a morbid condition, and that it contained two coloring matters not found in the blood of healthy children, and besides a matter which rendered the serum coagulable, by which he explains the color of the cellular tissue and its induration.‡ This led M. Billard to repeat the experiments, and to add others, and the conclusion at which he arrived is that "the induration of the cellular tissue of infants is nothing more than simple œdema perfectly analogous to that in adults or old persons affected by disease of the lungs, heart, or bloodvessels. We find that their limbs occasionally are as hard as those of infants in this disease. If in infants the surface is very red, it is owing to the habitual congestion of this part."

Andray§ and Auvity state that the lung is often gorged with blood, and yet filled with air; sometimes, on the other hand, collapsed, black, and gangrenous. M. Valleix merely observed that these organs

* Mal. des Enfants nouveaux-nés, p. 490.

† Underwood's Diseases of Children, p. 273.

‡ Considérations Gén. sur l'Analyse organique et sur ses Applications, p. 248.

§ Encycl. Method. Medicine, vol. v. p. 548.

were livid, and gave issue to a considerable quantity of blood when they were cut into, that this blood was accumulated in the most dependent parts. The lungs were more or less crepitating, and floated when cut into pieces. In two cases only, out of twenty-four, he found true pneumonia, but he also found portions of the lungs not yet penetrated by air. Troccon* and Dugès agree with Hulme in attributing this œdema to inflammation of the lungs, but the experiments of the former confirm the more recent conclusions of MM. Legendre and Bailly, and others, who have shown that the condition of the lung in this disease is not pneumonia, but atelectasis; that the lung is undilated, as in the fœtus which has never breathed; and that it may be inflated after death and made to assume the ordinary aspect of that organ. Dr. West observes: "We are, however, certain that the appearances, once thought to be the result of pneumonia, are in reality due to the unexpanded condition of the lung, and we can understand how it may happen, if children be exposed to cold almost immediately after birth, and then transferred to the ill-ventilated wards of a foundling hospital, and there fed with food far other than that which nature destined for them, that respiration may be but very imperfectly established; that their temperature may consequently fall, and the blood, flowing in part through the unclosed foetal passages, may stagnate in its course, may give rise to profuse effusions into the great cavities of the body, and to an anasarca swelling of the surface." M. Elsässer found lobular pneumonia in one-tenth of his cases.

In the pleura and pericardium there is a certain amount of serum effused, and the heart is filled with dark liquid blood; in a few cases there are small coagula. The large arteries and the veins are also full of dark-coloured fluid blood. Serum is also frequently found in the peritoneal cavity. The gastro-intestinal mucous membrane rarely exhibits any deviation from health, according to MM. Billard and Valleix, although M. Denis mentions that he has frequently found small ulcerations in the stomach and intestines. M. Elsässer found hyperæmia of the intestines, hypertrophy of the liver and of the spleen, hyperæmia of the kidneys, with traces of Bright's disease: in eight cases peritonitis with effusion, and in one purulent infiltration of the mesenteric glands.

The vessels of the brain are generally much congested, but the congestion is probably of a passive character. MM. Auvity and Elsässer are the only writers who have found effusion into the cavity of the cranium. In most of M. Elsässer's cases, the membranes of the brain were filled with black fluid blood, occasionally there was effusion of

* Sur la Malade connue sous le nom d'endurcissement du tissu cellulaire, p. 1814.

† Diseases of Infancy and Childhood, p. 163.

blood or serum in the lateral ventricles, and in one case the spinal marrow was covered with a layer of blood, the arachnoid soaked in it, and the brain softened.*

Complications.—These do not appear to be very frequent, the undilated condition of the lungs, or portions of them, being the most common. In five cases out of twenty-five, M. Valleix found pneumonia, and in two more congestion, which was probably inflammatory. Affections of the nervous system, and of the digestive organs, jaundice, &c., though not quite unknown, are rarely observed; and in one case M. Valleix saw an attack of erysipelas.

Causes.—Palletta, in 1823, denied the influence of cold in the production of this disease, and attributed it to flaccidity of the lungs, especially the right, after birth, which he supposes gives rise to congestion of the lungs and an arrest of circulation, which occasions engorgement of the liver. M. Valleix objects to this theory as being opposed by the experience of Billard, Blanche, Denis, and himself. M. Leger,† who probably expresses the opinions of Breschet also, enumerates various causes, chiefly a disturbance of respiration and circulation, which renders the blood more serous, also the non-obliteration of the foetal opening and the excess of coagulability of the serum. Again, he regards jaundice as the first degree of the malady, and lastly he considers that in these cases the brevity of the intestinal tube a direct agent. Of the first of these causes there can be no doubt, but the latter suppositions have either been disproved by more recent researches as matter of fact, or we may reasonably doubt their having much to do with the production of this disease. M. Denis regards the œdema as resulting from an irritation of the cellular tissue coincident with different internal affections, and especially with gastro-enteritis. The facts cited by M. Leger, however, sufficiently refute this opinion. M. Valleix very justly regards the œdema as dependent upon the arrest of the blood consequently upon the disturbance of respiration and circulation: and the still more recent researches of Bailly, and Legendre, and others, seems to prove that this disturbance is owing to an undilated condition of a portion of the lungs.

Feebleness of constitution is no doubt the chief predisposing cause; thus, it is very common with premature children, as was remarked by Palletta and Valleix; and M. Lediberder saw two children expire a few minutes after premature birth with the characteristic respiration. Yet it should be stated, on the other hand, that the disease may occur in healthy, well-made children born at the full time.

Cold is undoubtedly the principal exciting cause, as in 177 cases mentioned by M. Billard, 106 occurred in the colder months, and out

* Archives Gén. de Méd., May, 1853, p. 543.

† Thèse Inaugurale, Paris.

of 338 cases given by M. Valleix, 283 occurred in the six winter months.* The latter eminent observer mentions that children brought to the hospital from different parts of Paris, and badly wrapped up, are more liable to the disease than those from the Maternité.

Diagnosis.—There are but two diseases with which œdema of the cellular tissue is very liable to be confounded, *infantile erysipelas with infiltration*, but the latter disease commences most frequently in the face, the parts are of a deep red color, hot, swollen, and prominent, and the child is evidently in pain, which is widely different from œdema; and the peculiar character of the respiration and circulation in the latter disease, is entirely wanting in erysipelas.

2. *Induration of the Adipose Tissue.*—As I have mentioned, this is an affection of the last moments of life, generally, and it may be entirely, a cadaveric condition, as has been observed by Underwood, Billard, and Valleix. The aspect of the child is different, its colour is white or yellowish, the skin and subcutaneous tissues appear solidified, and the parts attached are generally different. The only symptoms common to both are the coldness and the feeble cry.

Prognosis.—The prognosis is serious in all cases, both from the nature of the attack and from the weakness of constitution of the subjects of it. By far the greater portion of the patients die, and for premature, or especially weakly infants, one cannot say that there is any hope.

Treatment.—M. Billard, to whose researches we are so much indebted, thus expresses the results of his observations: "The therapeutic indications which follow from the preceding considerations are, 1, to combat the general plethora by a certain amount of loss of blood; 2, to excite the skin by irritating frictions, by the use of flannel, and all means proper to establish the cutaneous circulation. The vapour baths, for the administration of which M. Peligot has arranged an ingenious plan at the 'Hospice des Enfants Trouvés,' have not produced, according to M. Baron, as good effects as frictions and the application of flannel. I have often seen these latter means succeed perfectly. The respiration, during the bath, is sometimes painfully impeded, and occasionally congestions and sanguineous effusions into the lungs or brain have followed their administrations."† Andry, Auvity, Louvelle, Underwood, and others, agree that the principal means of relief are warm baths and frictions with flannel. M. Valleix is a decided advocate for the abstraction of blood by leeches; but even in some cases where they had afforded relief, the child was carried off by erysipelas.

In addition to the means for the relief of congestion, our endeavours

* Clin. des Mal. des Enfants, p. 649.

† Mal. des Nouveaux-nés, p. 208.

must be to excite the lungs to action and to restore warmth to the child. It might be worth while, I think, to try the effect of electro-galvanism through the lungs, and internally we may administer ammonia in almond milk or wine whey if the child can swallow. Some attention should be paid to the bowels, either by purgative enemata, or, as Underwood advises, by placing a grain of calomel in the mouth.

SECTION VII.

FEVERS.

CHAPTER I.

INFANTILE REMITTENT FEVER. GASTRIC FEVER.

No doubt many of the diseases of infancy and childhood are accompanied by fever, and to so great an amount as even to mask the local and primary disorder; but besides these attacks, we find them liable to fevers, which, in a great degree, resemble those of the adult. Armstrong, Underwood, Hamilton, Butter, and more recent English writers have given us more or less full and accurate accounts of a fever which some call worm-fever, others mesenteric, gastric, or infantile remittent fever, and the more modern French writers have added a description of typhoid fever. That these are the same in kind, but different in degree, would, I think, be a hazardous assertion, notwithstanding these pathological resemblances, for the course and symptoms differ very considerably; the former being very common in private practice, the latter rather rare. Amongst the poor, and in foundling or children's hospitals, both forms are sufficiently common.

Infantile remittent fever is a disease to which children are very liable from one year old to ten or twelve, or even later. It is characterized by one or more daily exacerbations and remissions, by disorder of the stomach and bowels, occasionally by headache and by its uncertain duration. The best description of the disease will be found in Dr. Butter's essay;* he divides the disease into three varieties,

* A Treatise on the Infantile Remittent Fever, 1782.

the acute, the slow and the low, remittent; the latter appears to me to resemble typhoid fever. Others speak of acute and chronic remittent. The variations seem to depend chiefly upon the progress and duration of the disease, its complications, the modifications impressed upon it by the peculiar constitution of the child, or the prevailing epidemic influence.

Symptoms.—In some cases the disease commences quite suddenly by a severe febrile paroxysm in the night, with heat of skin, quick pulse, flushed face, &c. The thirst is intense, the tongue dry and furred; there is restlessness and agitation, perhaps delirium; the child, if old enough, complains of headache, intolerance of light and sound, and soreness or pain in the belly. Nausea and vomiting not unfrequently occur, and the matter vomited is yellowish or greenish, and has a sour smell. Towards morning, these symptoms abate, the skin becomes cooler, the pulse quieter, and the tongue more moist; but still the skin remains dry, the tongue loaded, and the pulse quicker than natural. The child is uneasy and fretful, the abdomen more or less tender, the urine scanty and high coloured, and afterwards often depositing a white sediment, or becoming white and chalky, although clear and of the ordinary color when passed. During the day there is a still further improvement, and the child may even regain some of its natural liveliness, although the occasional languor and uneasiness reveal the remains of indisposition. Towards evening the paroxysm returns, with fever, uneasiness, headache, &c., as before, to be succeeded by remission in the morning.

Or, as in many other cases, the attack may come on more gradually, preceded several days by indisposition. The child looks unwell, is uneasy and fretful, picks its nose, has heavy, offensive breath, with a short, dry cough, loss of appetite, pain in the head and abdomen, and occasionally flatulent enlargement of the latter. The sleep is uncomfortable, and interrupted by starting, moaning, and grinding the teeth. The urine is scanty, turns milky soon after it is passed, or deposits a whitish sediment. The bowels are irregular, often in extremes, either costive or too free. Soon after this the fever is developed, ushered in sometimes by a cold fit with rigors; sometimes stealing in so quietly that its commencement is not noticed. The paroxysm comes on in the evening, as I have just described, with hot skin, quick pulse, great thirst, flushed face, &c., lasting during the night, and followed by more or less complete remission in the morning and during the day. When the fever is very severe, the remissions are shortened and less perfect, or may even be scarcely perceptible.

During the exacerbations, all the symptoms are aggravated; the child is drowsy, but sleeps uneasily; it moans, starts, and talks incoherently, or it may wake with a scream; the skin is hot, the pulse rapid, varying from 140 to 160, the respiration quick and hurried; there is a rough cough, uneasiness in the bowels, with flatulence, and occasionally nausea and vomiting.

During the remissions, all the symptoms subside to a certain point, the patient is tolerably lively and cheerful, the skin cooler, the pulse from 100 to 120, and if he sleep, he does so quietly and calmly.

In the majority of cases the paroxysms occur but once in the twenty-four hours, and in the evening, but they may be more frequent. There are sometimes three in the same space of time, one in the morning, another at noon, and a third, the longest and most severe, in the night, but such cases are very rare. Ordinarily, the daily paroxysm, with remission, is the characteristic of the disorder, and continues during its entire duration, but some changes take place in the other symptoms, and the impression made upon the child by the pain varies in its intensity. For example, the headache, which is generally troublesome at the beginning, especially during the exacerbations, gradually ceases, unless there occur some cerebral complications. The cough continues longer, but if there be no pulmonary disease, it is only occasional, not very troublesome, and by degrees diminishes. The respiration is always hurried during a paroxysm, and is hardly as quiet as usual during the remission, but nothing is heard beyond a mucous r  le, and percussion gives a clear sound. The breath has a sickly odour, and is sometimes very offensive.

The local irritation, which is frequently developed the first, or if not, which is certainly the most common, and persists the most obstinately, is disorder of the intestinal canal. The appetite entirely disappears, but the child is extremely thirsty. Dr. Pemberton observes that, "digestion seems perfectly at a stand, for the food which is taken into the stomach will often be brought up unaltered, though it shall have remained down a considerable time. The intestines also seem in a manner paralyzed; they exert no action on the food, for it passes off like a mass of putrid vegetable and animal matter, which has been sometimes subjected to heat and moisture, without its having the smallest resemblance, either in appearance or smell, to those f  ces where the powers of digestion have been exerted. When the disease has continued for some time, the appetite is so totally destroyed that for six or eight days together, I have known the whole nourishment to consist of about half a pint of toast and water in the twenty-four hours."* The state of the bowels is very irregular and uncertain; they are sometimes constipated at the beginning and then attacked by diarrh  a; or they may be too free from the commencement, and afterwards the diarrh  a may continue or alternate with constipation. I think that in the majority of cases the bowels are too much moved, and with considerable irritation. The amount of each discharge varies a good deal: sometimes there are copious evacuations; in other cases, very little f  cal matter, with much wind. The character of the stools is unhealthy, and highly offensive; they may be clay-colored, or dark

* On various Diseases of the Abdominal Viscera, p. 165.

and slimy, resembling tar, or occasionally mixed with mucus and even blood. In the latter cases the attack assumes very much the character of dysentery. The abdomen feels very hot to the hand, is somewhat tender on pressure, and the child now and then complains of pain in the bowels. In some cases the belly is distended with flatus, in others it is flat, or even concave. Worms are sometimes discharged by stool, and this has given rise to the opinion that the disease is caused by them; occasionally, but very rarely, they are ejected from the stomach, and now and then they have been observed to crawl out of the anus spontaneously. The urine, which at first turns white soon after it is discharged, in general becomes yellow and highly transparent. Dr. Condie mentions that he has noticed a rose-colored lenticular eruption upon the abdomen and inner surface of the thighs, and occasionally sudamina upon the abdomen or along the front and sides of the neck. Dr. Coley states that he has observed a scaly desquamation of the cuticle in remittent fever, resembling that in scarlatina, and also that described by Dr. Pemberton as peculiar to diseases of the mesenteric glands.*

The disease may go on thus from day to day for an indefinite time without any very formidable symptoms arising, but without any advance being made towards cure, the child becoming weaker and thinner until it is so reduced in flesh and strength that recovery seems most improbable, and yet even from this state they rally astonishingly if no complication take place. By slow degrees the bowels become more quiet and regular, the discharges more healthy; the urine again deposits a copious sediment; then the tongue becomes cleaner and the pulse falls; a gentle moisture appears on the skin, the sleep becomes quiet and refreshing, and the daily exacerbation ceases to occur. The pulse, however, in some cases, remains quicker than natural for a time after the other symptoms have disappeared.

On the other hand, the result in many cases is not so favorable; the child may sink from exhaustion or from the intestinal affection taking on a more serious character, presenting the form of entero-colitis or colitis, and in its reduced state, proving rapidly fatal to the child; or lastly, and perhaps more commonly, the nervous system may become implicated and the child be carried off by a convulsion or by an attack of secondary meningitis. Of these complications I shall say a few words presently.

The *duration* of this fever is both uncertain and variable; it may last from a week to a month, and it very rarely indeed terminates by a crisis. But not only is the duration variable, but also, if I may use the expression, the rate of progression, and this is probably a sufficient explanation of Dr. Butter's slow variety, in which he remarks that the

* Diseases of Children, p. 190.

disease comes on gradually and unnoticed ; the child slowly declines, the appetite diminishes, then fails altogether ; the breath is offensive and the abdomen enlarged. One daily exacerbation occurs in the evening and lasts until morning, succeeded by a profuse sweat. During the day, the skin is dry and harsh, and there is a hectic flush upon the cheeks. The pulse ranges from 100 during the remissions to 140 during the exacerbations. The child is sleepy, dozing uneasily, with starting and moaning, and, when awake, he picks his nose and fingers until they are sore. The tongue is white, loaded, and moist ; there is no appetite, and but little thirst ; the urine is of a deep yellow color, and in the morning contains a sediment. The stools are unhealthy, and of the same kind as in the former variety. This form of disease may be developed very slowly, and may last for one or two months, reducing the child as much as the other form, but less rapidly.

Dr. Condie has given a description of a chronic form of the disease, which answers pretty accurately to this slow variety of Dr. Butter : "The exacerbations," he says, "are of longer duration, but marked by symptoms of less intensity than in the more acute attacks of the disease ; the remissions are also less distinct. The abdomen is usually tender and hot, and generally tympanitic ; the bowels are often affected with diarrhœa, the dejections being always unhealthy in appearance, and fetid. The tongue is thickly coated on its upper surface with a yellowish or brownish mucus, and red and dry at its point and edges : the teeth are often covered with sordes, and the lips parched and cracked ; the urine is scanty and high-colored, throwing down a copious white sediment, particularly during the remissions ; the skin is dry, harsh, and of a sallow or dirty hue ; the countenance is contracted and wrinkled, presenting the appearance of premature old age. The appetite is often unimpaired, and in some cases it is even voracious ; in general, however, it is altogether lost. The child is very generally affected with a short, hacking, frequent cough. Most commonly there is urgent thirst. There is always more or less fretfulness and the usual indications of suffering, and the patient exhibits a disposition to pick almost constantly at some portions of its face or body, or at the bedclothes, or at the face and arms of its attendants. If there be an accidental pimple on the skin, this will usually be picked until a sore be produced, the edges of which are still more eagerly attacked, so that the fingers are constantly stained with blood. This picking is by many considered to be one of the diagnostic symptoms of infantile remittent fever ; it is, however, a common phenomenon in all the chronic affections of childhood, and is often observed when no disease whatever is present."*

Yet again, the symptoms and course of the disease may be varied by the constitution of the individual, or perhaps by the atmospheric

* Diseases of Children, p. 273.

constitution of the time, to produce what has been termed the low form of infantile remittent; and I gladly avail myself of the summary which Dr. Joy has given us: "The low infantile fever begins suddenly, and for the first week perfectly resembles the acute, save that the head is more affected, and delirium sometimes occurs. After this the low state succeeds, the child becoming quiet, indifferent to surrounding objects, and indisposed to answer questions. He rarely asks for anything, but takes his food or drink when it is offered to him. The trunk and lower extremities generally remain fixed in one posture, but the arms and hands are almost always in motion when he is awake; sometimes he flings them about, and at other times picks not only his nose and lips, but even his tongue, eyes, and other parts of his face, till they become sore. At the height of the disease the difficulty of replying to questions, arising from debility, terminates in a temporary loss of speech and voice, and the jaws are occasionally locked together. He slumbers much during the exacerbations, and in the remissions performs with his hands the gesticulations above described. When the low stage sets in, the eyes are reddish, dull, and inattentive; the countenance is expressive of distress; and the tongue, teeth, and lips, are covered with a blackish fur. The patient is particularly uneasy before stools, or the escape of flatulence; the urine and stools which are of unnatural appearance, are involuntary, yet he is quite sensible; the pulse, which is about 100 in the remissions, rises to 120 in the exacerbations. When the disease takes a favorable turn, the exacerbations become shorter, the child is less drowsy, the eyes are clearer and more observant, the countenance is placid, and the tongue cleaner, the pulse is calmer, and the appetite returns; the voice is regained, and, though weak at first, soon becomes stronger, and is frequently exercised, as he cries whenever he is disturbed or wants anything, or if he feels himself unable to reply to questions, or to put out his tongue when desired. The strength, flesh and color are gradually recovered, and he yawns, sneezes, or coughs, which he was previously unable to do; the urine, which is of a straw color, is still for a considerable period passed involuntarily; crying and fretfulness long continue; the stools at length become natural, and there is no complaint made but of weakness. The pulse occasionally continues accelerated till the recovery is complete. The duration of this fever is from a month to six weeks, or even longer."*

In practice, various modifications, both of the symptoms and course of the disease, are observed, all of which cannot easily be enumerated. One of them has been noticed by Huxham, who says: "In the fevers of children the face is sometimes drawn to one shoulder. I have often seen this, but never knew it continue long after the fever was cured." Underwood has noticed this also; and Dr. Joy adds, a tenderness and

* *Cyclop. of Pract. Med.*, vol. ii. p. 241.

"intolerance of pressure in the upper part of the spine; with this, a general increase of the sensibility of the whole surface of the body seems sometimes to co-exist, so that the child can scarcely bear to be touched in any part."

Complications.—As I have already stated, the child may no doubt sink from exhaustion in this disease, but I am sure that all who have had much experience, will agree with me that the chief danger is from the complications which occur at different periods of the fever. The principal ones are the following:—

1. *Convulsions or Meningitis.*—It is rarely we see convulsions at the commencement of the fever. I have, however, known the nervous system very much disturbed in one or two cases, as was marked by visions when awake, distressing dreams and startings when asleep. But in general it is only after some time when the disease has reduced the strength of the child, and at the same time increased the irritability of the nervous system, that the attack is to be feared. Sometimes the child is attacked by one or more convulsions, followed by stupor, occasional staring or starting, twitching of the muscles, &c., or the symptoms of secondary meningitis may gradually steal on without a convulsion. We may find the child heavy, with diminished intelligence and sensation, with the hands clinched, the thumbs turned inwards, the eyes staring and twinkling, and repeatedly sighing. Or the child may be restless, crying, rolling the head, picking the limbs, &c., and by and by there may follow an attack of convulsions, or paralysis of one side of the body, and convulsive movement of the other. The symptoms of meningitis are generally modified by the weak condition of the child, and some may be absent, or the child may be carried off before time has been allowed for their development. This attack may be regarded as a reflex irritation from the disordered intestinal canal, ending, in many cases, in inflammation. It is a very fatal complication, and in remittent fever is always to be dreaded; no visit should be made without a careful scrutiny into the condition of the nervous system, nor a moment lost when any suspicious symptom arises.

2. *Entero-colitis, or Colitis.*—That remittent fever is always accompanied by more or less gastro-enteric irritation is quite evident, but there is room for doubt as to whether this amounts to inflammation in ordinary cases. In certain cases, however, this complication does take place, and it may occur at any period, either early, or, which is more common, at an advanced stage. Enteritis will be marked by an increase in the intensity of the abdominal symptoms, such as pain, tenderness, tympanites, diarrhœa, &c. Colitis or dysentery, by the frequent desire to go to stool, and the substitution of small quantities of mucus and blood for the former unhealthy discharges, with tenesmus, and the other symptoms of dysentery, general and local, already described.

3. *Bronchitis or Pneumonia.*—From the beginning there is generally a troublesome cough, indicating that the mucous membrane of the bronchial tubes, as well as that of the intestines, is in a state of irrita-

tion, and this not unfrequently degenerates into an attack of bronchitis, with the usual symptoms and signs. It is more rare, though not very uncommon, to find an attack of pneumonia supervene.

4. *Paralysis*.—When an infant recovers from remittent fever, it is sometimes found to have lost, partially or wholly, the use of a limb or of certain muscles, as I have already noticed when treating of paralysis. These effects may be the consequences of inflammation of some portion of the nervous system, but more frequently they seem to be the results of reflex irritation.

5. *Pericarditis*.—This cannot be a frequent complication, as it is not mentioned by any writer, I believe, but as a well-marked and ultimately fatal case occurred in my own practice, I think it right to mention it.

Pathology.—In cases which have proved fatal, we invariably find a certain amount of disease of the intestinal canal, but it may not be easy to separate the amount of disease due to the existing complications. Evidences of inflammation, varying in extent and intensity, are generally found in the stomach and small intestines, sometimes in the ilium chiefly, or in the ilium and colon. The mucous membrane is reddened in patches, or exhibits red striæ or points, or it may be thickened, softened, or ulcerated. The isolated follicles are generally enlarged, as well as the patches of follicles in the small intestines, and they are sometimes softened or ulcerated. The mesenteric glands are frequently enlarged, sometimes considerably, and they have been found in a state of suppuration, and containing tubercular matter. The liver is sometimes congested, but rarely the seat of organic disease. When the patient has been carried off by meningitis, colitis, or entero-colitis, or disease of the lungs, the usual appearances will be found.

We now come to the consideration of the nature of this fever. Is it a fever depending upon the presence of worms, or is it a gastro-enterite, or a fever with gastro-enteric complication, but not caused thereby? In favour of the first opinion we have some who were great authorities in their day (Baglivi, Hoffmann, Sauvages, &c.) and the fact that worms are occasionally discharged, but neither of these is conclusive. In the majority of cases no worms at all are discharged, and they are rarely detected by a *post-mortem* examination.

We must, therefore, seek for some more general pathological condition to explain the disease, and as the symptoms during life generally indicate gastro-enteric disturbance, and the *post-mortem* appearances are those of irritation or inflammation of the gastro-intestinal mucous membrane, that has been generally assumed by modern writers to be the essential element of the disease. Thus, for example, Dr. Underwood considers it merely as an affection of the *primæ viæ*. Dr. Butter attributes it to a debilitated condition of the digestive organs,

and to an accumulation of unhealthy secretion in the bowels, connected with the peculiarly sensitive constitution of children. Dr. Pemberton regards the fever as symptomatic of derangement in the intestinal canal. Dr. Eberle agrees with those who attribute it to irritation located in the stomach and bowels, with disorder of the biliary organs. Dr. Stewart, that "the great cause is excitement of the intestinal mucous membrane." Dr. Condie considers it in every case as "the result of inflammation, most commonly subacute, of the digestive mucous membrane." Sir Henry Marsh observes, that "its characteristic symptoms, if closely analyzed, will all of them be found to point to the mucous surface as the original seat of morbid action,"* with which opinion Maunsell and Evanson concur. Dr. Joy regards it merely as a variety of gastric fever, modified by the irritable constitution of infancy. The French authorities are nearly unanimous in regarding the disease as "gastro-enterite," and the fever as symptomatic. At the same time, however, I may observe that if there be a doubt whether the morbid condition of the intestinal mucous membrane be the cause, or only a concurrent symptom of the continued fever of adults, the doubt is equally applicable to the remittent fever of children. I can quite easily believe that although certain pathological conditions may be found in both, yet in both these may not be the essential cause, but rather the effect of a continuance of the disease, the essence of which is more general.

Causes.—Cold, teething, irregular or unwholesome food, or excess, with neglect of the bowels, seem to be the principal exciting causes of the disease. I am not sure whether over-dosing with purgatives may not also give rise to it. It has been said to be contagious, but I believe very erroneously. That it prevails epidemically, appears beyond doubt. Dr. Butter speaks of it as either sporadic or epidemic, and Dr. Sims has described an epidemic which occurred at the same time with the prevalence of a low nervous fever among adults. "It was called, he says, "by some a worm fever, though I believe worms were seldom the cause, yet as that lay apparently in the stomach and intestines, the error did not materially affect the practice."

Remittent fever may also occur as a *secondary* affection in the course of or subsequent to other diseases, and when it does so it may exert a very unfavourable influence upon their character and terminations. Thus we find it complicating hooping-cough and other pulmonary affections; following upon the sudden cure of an eruption; as one of the sequelæ of scarlatina or measles; or as a termination of dysentery. The characteristic symptom, *i.e.*, an evening exacerbation, followed by a remission, is always present, although from the presence of concurrent symptoms of another kind, it may require more care than usual to satisfy one's mind.

* Dublin Hosp. Reports, vol. iii. p. 316.

Diagnosis.—1. The most important point, and in many cases our greatest difficulty, is to distinguish remittent fever with certain symptoms, from some forms of meningitis; and not only is it far from easy, but in many cases, towards the end of the disease it may be impossible, because of the supervention of certain head symptoms, such as drowsiness, staring, starting from sleep with screaming, &c., which may be either functional disturbance, the result of irritation merely, or the commencement of hydrocephalus. In such cases, time and the result of treatment are our only helps.

In other cases it may assist us to remember, that in remittent there are no distinct stages, no changes in the pulse, such as we noticed in meningitis; that there is a *distinct remission which there is not in meningitis*; that the disease lasts for a much longer time; that the heat of the head is not specially increased; that there is not generally clinching of the thumbs and toes, or twitchings; that the head is not rolled or tossed about; that, except at the first, there is no intolerance of light or sound; that the intellects are not obtuse; and that, unless complicated, there is no convulsion. Further, although there may be occasionally vomiting, there is sufficient gastro-enteric irritation to account for it, and very much more than is usual in hydrocephalus.

2. There is some degree of resemblance occasionally between remittent fever and mesenteric disease. Dr. Coley observes they may be distinguished “by the accession of fever occurring in the latter, generally in the evening only; by the child being more restless at that time instead of being inclined to sleep; by the intestinal evacuations having but little alteration from their natural appearance; by a peculiar mark of distress in the countenance; by the sleep in mesenteric disease, after the paroxysm of pain has subsided, being for the most part undisturbed; and by the length of time the complaint has existed. The fever accompanying the disease in the mesenteric glands is of a hectic nature, and always periodical, gradually terminates with proper perspiration, and is free from delirium.”* I should rather depend upon the latter characteristics than the former, adding to them the fact, that in an advanced stage of *tabes mesenterica*, the enlarged glands can generally be felt.

Prognosis.—Notwithstanding the lengthened nature of the attack, and the great extent to which the child is reduced, if there occur no complication, the prognosis is by no means unfavorable. The majority of such cases recover; and those who die, either sink from exhaustion, or, more commonly, are carried off by some complication. Convulsions or hydrocephalus, coming on after the disease has lasted some time, are almost invariably fatal. Pulmonary or intestinal inflammation, though not so certainly mortal, are frequently so, and require not

* On Diseases of Children, p. 192.

merely great care and skill, but a strong constitution on the part of the child, to enable it to struggle through.

The diminution of the exacerbation, the return of healthy evacuations, of sleep, appetite, and a quiet pulse, are all favorable symptoms; whilst, on the other hand, an increase of fever, with either abdominal, pulmonary, or, still worse, cerebral symptoms, is highly unfavorable.

Treatment.—Very active antiphlogistic treatment is out of the question in uncomplicated cases of infantile remittent, but when the pain and tenderness of the abdomen are more than usual, a few leeches may be useful, followed by poultices; but it is rare that we find them necessary. In the majority of cases, one of the very first things to be regulated is the diet and regimen of the patient; if he be not already in bed, he should be placed and kept there. The feverish restlessness and the natural impatience of children, often render this unpleasant to them, and nurses are induced to indulge them, but I am satisfied that much injury may be done by taking the child up when it is restless. Let it be lightly covered, and placed in a well-ventilated, cool room, and let it understand that it must remain in bed, and its impatience will generally cease. It will be well to examine the gums, and scarify them thoroughly if there be any evidence of irritation from the teeth.

The next question concerns the state of the bowels: if we see the child early in the attack, and they be constipated, a brisk purgative will be very useful, either calomel with rhubarb or jalap, or calomel followed by castor oil, will generally act mildly and fully. Dr. Butter preferred the sulphate of potash or some of the neutral salts; Sydenham gave an infusion of rhubarb in beer; Dr. Hosack infusion of senna with super-tartrate of potash and manna. I do not think it matters much what medicines we use, provided the bowels are fully evacuated. On the other hand, and quite as frequently, the bowels may be too free, or purged frequently but in small quantities indicating a considerable amount of irritation; our object in these cases will be to quiet them by chalk mixture with a few drops of laudanum, or by a mixture of mucilage, syrup, caraway-seed water, and a small dose of laudanum. I have also found great benefit from Prussic acid in minute doses ($\frac{1}{4}$ to $\frac{1}{2}$ of a drop three or four times a-day) in quieting this irritation, and it has the advantage of soothing the bronchial irritation at the same time. Dr. Butter gave hemlock when diarrhoea was present: he dissolved five grains of the extract of conium in four ounces of water, and gave two teaspoonfuls for a dose to a child of five years old. He thought it both checked the looseness and relieved the fever.

Having by these or similar means regulated the bowels, we may next proceed to combat the disease by giving small doses of calomel and antimonial powder, as Dr. Cheyne advises. He says, "antimonials in combination with cathartics, and more especially calomel, have appeared to me very useful in those cases of infantile remittent fever in which the sensorial functions are much oppressed, as also in the commencement of febrile attacks of a less definite nature, which

are liable to degenerate into hydrocephalus. In such cases I prescribe a pill of calomel and antimonial powder, three times a-day, interposing between every two pills a moderate dose of the common purgative mixture." When the bowels are too irritable to bear calomel, the hyd. c. cretâ and Dover's powder, and sometimes ipecacuanha may be substituted with great benefit. Two grains of the former, with half a grain of each of the latter, may be given three times a-day to a child of three or four years old. A saline diaphoretic mixture may also be advantageously exhibited, provided the bowels are not too irritable to bear it.

Warm baths, fomentations, or still better, poultices to the abdomen, afford great relief; the latter I often directed to be made of linseed meal, with a small portion of flour of mustard. Or we may use rube-facient or slightly irritating liniments, containing laudanum, if there be much pain or irritability of the bowels.

If the cough be troublesome, some soothing, expectorant mixture may be ordered. Ipecacuanha, or squills in almond milk, with a little paragoric, answers the purpose very well, or almond milk with laurel water, or the small doses of hydrocyanic acid I have already mentioned.

When the disease has lasted for some time (but the precise moment must be left to the judgment of the practitioner), we may have recourse to mild tonics. Dr. Pemberton, indeed, gave a light infusion of cascarilla, three times a-day throughout the whole disorder. Minute doses of quinine may be given, and Dr. Clarke is an advocate for their early employment. After giving an emetic and a purgative he at once began with the bark. "By this means," he says, "the nervous symptoms which so frequently accompany fevers in the delicate habits of children, are, for the most part, happily obviated."

Dr. West speaks favorably of the following prescription, if there be no abdominal irritation, viz: four minims of dilute hydrochloric acid, eight of the compound spirit of sulphuric ether, and three drachms of camphor mixture, every six hours, for a child of five years old.

The diet should be very moderate, or even low, at first. Milk in every form, arrowroot, sago, gruel, tea, &c. may be permitted, with plenty of cold water if the child be thirsty. When, from the duration of the disease, weakness and exhaustion have resulted, we must improve the diet, and allow chicken-broth, beef-tea, &c. In some cases it is absolutely necessary to give wine and water or wine whey; nor have I found the tendency to cerebral complications at all increased thereby, if it be given in small quantities, frequently repeated. During convalescence also, great care must be used, in returning to the usual diet, not to overfeed the child; and in resuming its usual habits, that it shall not be exposed to cold.

Of the treatment of the complications I need say very little, having entered fully into the subject under the different heads, but I may just

observe that the activity of the treatment will be modified by the period of the disease and the condition of the child. If the head be affected, and the child able to bear them, a number (in full proportion to the strength) of leeches should be applied, but if the child be too weak, we must rely mainly upon counter-irritations and mercurials. The same remark applies to pneumonia complicating the disease, but in no case is an immediate impression upon the disease so urgently called for as in convulsions or threatened meningitis.

CHAPTER II.

TYPHOID FEVER.

WITHOUT entering into the relation of typhoid fever to remittent, whether they are essentially different diseases, or different degrees of the same affection, for which this hardly appears a suitable place, I may remark that those who have seen them in private practice, and more especially as they occur in foundling or children hospitals, will have no difficulty in recognizing such a difference as will justify my giving a separate description. Although we occasionally meet with typhoid fever in private practice, in this country, I do not think it is very frequent, most cases of fever being rather the infantile remittent: but amongst the children of the very poor, badly fed, and of deteriorated constitutions, and especially when congregated together, it is sufficiently frequent both here and on the continent. It is rarely mentioned by British or American writers on diseases of children. On the continent I find that in 1834 Dr. Bell's Thesis was published, showing that the disease was not rare in infancy, and this was followed by the researches of MM. Constant,* Larroque, Gendrin, Littré, Becquerel, Taupin,† Rilliet and Barthez, Audiganne,‡ Brichteau, and Barrier, &c.

It appears that typhoid fever is not so common among infants as

* Gazette Méd., 1833-4-5-6.

† Journ. des Connais. Méd., Nov. 1839.

‡ Gaz. Médicale.

remittent; it rarely occurs during the first years of life, nor is it frequent until the age of eight or nine and upwards. M. Charcelay, however, has published some cases in new-born infants.*

Symptoms.—The attack generally commences without anything distinctive, resembling the febrile attacks of children in general. The child complains of lassitude and weakness, indisposition to exertion, either mental or physical, occasionally with rigors followed by heat; either he is sleepless, or his sleep is restless and disturbed; there is generally headache or a sense of heaviness in the head, with aching of the loins and limbs, thirst, loss of appetite, and derangement of the digestive functions, &c. These symptoms may continue for a few days or a week, the fever becoming gradually more developed, with great thirst, sore throat, sometimes vomiting, uneasiness or pain in the bowels, diarrhœa, loaded tongue, &c. The fever is generally continuous, but occasionally with remissions. The headache is still troublesome, and the child complains of giddiness in attempting to sit up or walk; the sleep is much disturbed, and sometimes the patient is harassed by visions and hallucinations; the countenance loses its natural expression and becomes heavy. The intelligence is diminished, and answers to questions are made slowly and apparently with difficulty. Epistaxis frequently occurs.

As the fever increases, all these symptoms are aggravated, diarrhœa occurs, the abdomen becomes tympanitic, the pulse is full and frequent, the skin burning and dry, very rarely moistened by perspiration. In some cases the patient is delirious, and cough and râles announce the presence of bronchial catarrh; the urine is scanty and of a deep color. Sometimes during this stage, the rose-colored lenticular eruption makes its appearance, although it is generally somewhat later. This stage has been regarded as analogous to the period of invasion of eruptive fevers, and it generally continues about a week. The *next period*, analogous to the stage of eruption, is marked by an aggravation of the nervous symptoms, and of those referable to the bowels. For the most part, the headache disappears, or is less troublesome, but there is greater prostration, the expression of the face is less intelligent; stupor and delirium alternate, the first chiefly by day, and the latter by night; the senses are impaired and obtuse, especially the hearing; articulation is difficult, and the muscular strength is abolished, the patient lying almost constantly on his back. There are subsultus tendinum, convulsive movements, &c. and the bladder is more or less paralyzed. At the same time the diarrhœa continues, the evacuations, which are more or less ample, are often involuntary and unconscious. The tongue, mouth, and lips are dry, and loaded with sordes; the patient swallows eagerly, but with some difficulty; the abdomen is hot and tympanitic, with rumbling and gurgling, especially in the cæcal

* Journal de Tours.

region. The cough and dyspnœa are occasionally considerable, even when the stethoscope indicates merely catarrh of the bronchial tubes. The pulse continues quick, although smaller and weaker, and the surface is always hot and dry. From the commencement of this period we perceive the rose-colored eruption, and as it advances, sudamina, and sometimes petechiæ, and blue patches on the skin. Bed-sores also occur on the sacrum or other part on which there has been much or continuous pressure.

The *third period* varies in its characteristics, according as the fever is to terminate favorably or unfavorably. In the latter case, the stupor degenerates into coma, the subsultus and starting become constant, the intellectual functions are obliterated, the senses nearly extinguished, the pulse extremely rapid, but small, feeble and thready. The skin is cooler, and either dry or covered with viscid cold sweat; there is often complete incontinence both of urine and fæces, the emaciation is extreme, the face becomes hippocratic, the bed-sores increase, and lastly, the respiration is embarrassed and becomes stertorous, and the patient expires.

On the other hand, when the course of the disease is more favorable, we observe a gradual mitigation of the symptoms, except in the few cases where a crisis occurs. The stupor is dissipated, the face assumes an intelligent expression, the eye consciousness, and the hearing improves. Then the patient recovers the power of speech, he speaks slowly, but intelligently, the mental powers are exercised feebly, but healthily. By slow degrees, muscular strength returns, the weakness now being that of exhaustion and not of nervous oppression. The fever subsides, the skin becomes moist and fresh, the respiration is natural, and the cough disappears. The abdominal heat and meteorism disappear as the fæcal evacuations become voluntary, less abundant, less fetid, and more natural; and the return of the appetite is an evidence that the patient is convalescent. But during recovery, much annoyance may be caused by indigestion or diarrhœa which follow any imprudence or excess in diet, and which are generally remedied by care and restraint, although such a relapse may prove obstinate or even fatal.

Modifications and Complications.—1. Although the preceding description may answer for the generality of cases, we must expect, of course, many modifications. The attack may be very slight, and then many of the symptoms I have laid down will be absent, others will be much slighter, and the entire course much shorter. Or some particular symptoms may offer an unusual degree of intensity or obstinacy.

2. Vomiting is one of these exceptional symptoms; it is much more common in the typhoid fever of children than of adults. Thus M. Taupin observed it in a third of his cases, MM. Audiganne and Barrier in about the same, and MM. Rilliet and Barthez in one half of

their patients. The vomiting may commence on the first but oftener on the second or third day, and, according to Rilliet and Barthez, is particularly common in those cases in which we have constipation instead of diarrhœa. It indicates that the case is a severe one.

3. Diarrhœa, which is perhaps the least variable of the symptoms, is nevertheless not constant. In about one-fourth of the cases there is constipation; neither when it is present, does it persist so steadily as in the adult, but it is interrupted and returns several times before ceasing or becoming permanent. The fœcal discharges are generally fetid, yellow, green or brown, but rarely bloody. On the fifth or sixth day they escape involuntarily. The tympanitis, abdominal pains, gargouillement and the tumefaction of the spleen are ordinarily very marked, and rarely absent in children.

4. The bronchial catarrh is as common in children as in the adult, at least it is rarely absent except in very slight cases. M. Taupin found it absent in four cases only out of 121, and M. Barrier in three out of twenty-four.

5. The nervous symptoms are as frequent as in the adult, and of the same character, but of slighter intensity, which is remarkable, considering the extreme susceptibility of the nervous system in children.*

6. Epistaxis, which occurs occasionally, is much more rare with children than with adults. M. Taupin observed it six times in 121 cases, MM. Audiganne, Barrier, Rilliet and Barthez, in about one-fifth of their cases.

7. The rose-colored eruption and sudamina are almost always present, but the former are, however, frequently limited to the back. Other eruptions, erythematous, vascular, or hemorrhagic, are rather more frequent in children than in adults.

Complications do not seem as frequent in children. 1. Intestinal hemorrhage is extremely rare. M. Barrier mentions but one case in 200.

2. Inflammation and softening of the gastro-intestinal mucous membrane are by no means unfrequent; they occurred in four-fifths of Rilliet and Barthez's cases. More intense inflammation, followed by perforation and peritonitis, occurs occasionally, but it is not easy to say whether perforation is more frequent than in the adult. M. Taupin met with two examples in twenty-one deaths, and M. Barrier two out of three deaths. This complication is marked by violent pain, tenderness, vomitings, meteorism, &c., and when perforation occurs, by collapse and death.

3. Pneumonia is by no means rare; it affects chiefly the more de-

* Stoeber, Clin. des Mal. des Enfants, de la Faculte, de Strasburg, 1841, p. 9.

pendent portions of the lungs, and rarely is found beyond the first stage, and never beyond the second. MM. Rilliet and Barthez met with twenty-two cases of this complication.

I need not say that any of these complications will add materially to the danger, and that some of them almost or altogether preclude the possibility of recovery. In all cases of fever it is of extreme importance that a vigilant watch should be kept for the early detection of any complication.

Morbid Anatomy.—There is almost an identity between the morbid changes accompanying typhoid fever in children and adults. In both we find certain changes which are almost invariable, as those in the intestinal follicles and the mesenteric glands, and others which are often wanting by their affecting the spleen, the bronchial tubes, the bladder, &c. The follicles may be found, at different periods of the disease, in a state of eruption, ulceration, or cicatrization. The changes affect equally the glands of Brunner and of Peyer, and may be observed in different parts of the large and small intestines, but especially near the cæcum.

During the stage of eruption the agminated follicles assume two appearances which are frequently united in the same subject, one of which has been termed the soft or reticulated patches, and the other the hard or figured. The former present the appearance of a membranous net-work, composed of a great number of small scales with depressions between them. The muscular tissue which is involved is always softened, and sometimes to such a degree that it will not bear the least traction. Thus the softer or reticulated patches are characterized by extreme development and softening. The hard patches are very different; they are prominent, with their borders raised above the level of the mucous membrane, and unresisting to the touch. If we make a perpendicular section of one, we find first the mucous membrane, which appears healthy, beneath that a moderately thick layer of a whitish or yellowish substance, homogeneous, firm, and shining when cut. Beneath this we find the cellular membrane, muscular and serous tissues as usual. This submucous deposition characterizes these hard patches. Similar changes are found in the isolated follicles. The color of the mucous membrane is variable, sometimes it is pale, at others of a vivid red, or of intermediate shades.

In the second period, the ulceration, which is a frequent but not necessary termination of congestion of the glands of Peyer, takes place in the following ways, according to M. Barrier. "1. It commences in the mucous membrane which covers the follicles, and spreads in depth and breadth. Occasionally several ulcerations are formed simultaneously on the surface of one reticulated patch, and uniting, from one large ulcer. 2. The submucous deposit in the hard patches may be softened, or attacked by gangrene, when it is eliminated by suppuration, and thus removes all or the greater portion of the mucous membrane. The remains of these figured patches, when colored by

the bile, have received the name of yellow eschars. The new matter deposited in the isolated follicles often resembles a core, which comes away, leaving a solution of continuity. The ulcerations are generally oval in the patches, and round at the isolated follicles; their extent as well as their depth varies, the bottom being formed by the submucous cellular tissue, or by the muscular, or by the serous. Lastly, in more rare cases, there is perforation of all the tissues; and if adhesions have not been previously formed, the contents of the intestine escape into the peritoneum. The borders of the ulcer are sometimes thin and clear cut, or thick, rounded, and granular, sometimes adherent, sometimes separated; the bottom is either smooth and uniform, or granular and unequal."* MM. Taupin,† Rilliet and Barthez have remarked that the period of ulceration is later in children than adults, although there are exceptions, and also that cicatrization is more prompt and rapid.

The stage of cicatrization is said to commence from about the fifteenth to the twentieth day, and is marked by the approximation of the borders of the ulcer, which become flatter and thinner, and by the filling up of its cavity by granulations. When the process is concluded, the mark of continuity in the mucous membrane is scarcely perceptible; it is smoother, without villi, and somewhat depressed at their points; at first of a deep red color, it afterwards becomes paler, and then assumes its natural appearance. MM. Rilliet and Barthez state that the blood is most frequently fluid, or in dark, soft coagula, and that the vessels are often stained of a vinous red color.

Such are the morbid changes found in the intestines in typhoid fever, but all may not always exist; in some only the congestive stage, in others only the reticulated patches are found, and it is quite possible that the fever may exist without any of these changes being discoverable. Corresponding pretty accurately with the stages of the follicular development, we find congestion, inflammation, and purulent infiltration of the mesenteric glands. It is not found, however, that they open for the escape of matter into the peritoneum, but it is supposed that the matter is absorbed. This purulent infiltration of the mesenteric glands is as characteristic of typhoid fever as the follicular changes.

Another organic lesion, which though by no means constant, is yet very frequent, is the tumefaction and softening of the spleen; both are generally coincident, but in some rare cases there is softening with diminution of volume. M. Taupin has observed apoplectic coagula, and in one case the entire spleen resembles a large clot. Of course when complications have existed, the usual *post-mortem* evidences will be found, but they, as we have seen, are neither numerous nor fre-

* Mal. de l'Enfance, vol. ii. p. 245.

† Journ. des Connais. Méd. Chir., Nov. 1839.

quent. There can be no doubt that the most important pathological change is in the blood itself, but unfortunately our means of investigation are limited, and the results as yet by no means satisfactory.

Causes.—I have already mentioned that typhoid fever can hardly be regarded as a disease of infancy, being by no means frequent until about the eighth or ninth year. A very curious fact connected with the disease is its greater prevalence among boys than girls. M. Taupin states that in 121 cases, 86 were males and 35 females; and Rilliet and Barthez, that out of 111 cases, 80 were males and 31 females.* It is very difficult to explain this, except by supposing a greater predisposition in the male sex. Typhoid fever does not appear to occur at all as a secondary affection in the course of or subsequent to other diseases. Among the predisposing causes may be placed bad food, vitiated air, and insufficient clothing, which by impairing the constitution prepares the child for serious illness.

But the spread of the disease is most frequently due to epidemic influence, whether it originate or not in peculiarities of climate, or of seasons, or the hygienic condition of certain localities; but which certainly is propagated, and so to speak intensified by these circumstances. A very curious fact is recorded by M. Rilliet, who observed in 1840, in a village near Geneva, an epidemic of typhoid fever which was confined to the children, and which terminated favorably in all cases. At the same time there prevailed in a neighbouring village, among adults, a most fatal ataxo-dynamic typhoid fever.

Opposite opinions have been held as to the contagion of typhoid fever in children as well as in adults. The experience of French physicians is against it. Of M. Taupin's 121 cases, 5 only could have acquired it in this way; of MM. Rilliet and Barthez's 111 cases, 4 only were attacked in hospital, and they were in wards in which there was no case of typhoid fever; and of the 17 cases observed by M. Audiganne not one afforded the least presumption of contagion.

Diagnosis.—There are several diseases with which typhoid fever has been confounded, and from which it requires great care to distinguish it.

1. *Enteritis.*—In some cases the history, symptoms, and course of the disease so closely resemble typhoid fever, that MM. Rilliet and Barthez have come to the conclusion that it is impossible to distinguish them; a conclusion very different from that of M. Louis, as regards these diseases in the adult.† In cases of secondary enteritis, the previous affection will decide the question.

2. *Meningitis.*—At the commencement these diseases resemble each other a good deal, but in typhoid fever the predominance of abdominal symptoms, and in meningitis, of head symptoms, soon becomes mani-

* Mal. des Enfants, vol. ii. p. 404.

† Recherches sur la Fièvre Typhoïde, Paris, 1844.

fest. In meningitis we have convulsions frequently; never in typhoid fever. The pulse is occasionally irregular, the intellect less obscured for some time, and constipation more common; in typhoid fever there is delirium, mental obscurity, bronchial catarrh, frequent vomiting, diarrhœa with tympanitic belly, and tenderness; and further, the course of the two diseases is very unlike.

3. *Typhoid pneumonia* has an aspect of typhoid fever, but a careful investigation into the history of the case, and an examination by the stethoscope, will show the presence of primary pneumonia, and we shall at once detect the absence of the characteristic abdominal symptoms of typhoid fever.

4. Slighter cases of typhoid fever may easily be confounded with gastro-enteritis, or with any slight febrile attack, but though a little care will probably lead us to a correct conclusion, it is a comfort that a mistake here will be of no consequence.

Prognosis.—When the fever is mild, and without complication, almost all the cases recover. Thus of 47 such cases observed by MM. Rilliet and Barthez, but one death occurred. The danger of perforation of the intestines, so great in the adult, is comparatively slight in children, as this is a rare termination. Even in the more severe cases a considerable proportion recover, and the chief danger appears to arise from the complications. As M. Taupin observes, “the patients may die from the intensity of the pulmonary, abdominal, or cerebral symptoms, from the abundant suppuration following the fall of the eschars, from intercurrent diseases in their weak state, from tubercular affections whose course is quickened by the fever, and from perforations of the intestine which may occur during convalescence in severe or even slight cases, so that we ought to be very reserved in our prognosis. However, we ought never to despair, for in no other malady do more recover from such a hopeless condition so promptly.”*

The intensity and persistence of the ordinary symptoms, their ataxic character, and the presence of any complication, may be regarded as unfavorable, whereas a moderate degree of diarrhœa and tympanitis, diminished vomiting, a clean tongue, a fairly developed pulse, &c., will afford us hope of a favorable termination.

Treatment.—The principal indications are thus enumerated by M. Fabre: 1. To limit the intestinal inflammation and remove any irritating matters from the intestines, first by antiphlogistics, then by purgatives. 2. To prevent if possible the bronchial complication, which so easily runs into pneumonia by antiphlogistics, revulsives, and change of posture. 3. By similar means to control the cerebral affection. 4. The general condition of the patient will require careful treatment, whether by soothing remedies, stimulants, or tonics. 5. The constitution of the patient and the character of the epidemic will also

* Journ. des Connais. Méd. Chir., Nov. 1839.

furnish special indications. The treatment in fact of typhoid fever in children does not differ essentially from that required by adults, and therefore I need not enter very fully into details.

Some modification of the antiphlogistic treatment is generally necessary, and in proportion to the intensity of the intestinal irritation. It is rarely necessary to open a vein, except when the fever is intense, but there are few cases which are not benefited by a few leeches to the abdomen or anus. After leeching, purgatives seem to be most beneficial; neither are they, according to M. Barrier, counter-indicated by the presence of diarrhœa, although they are even more necessary when the bowels are constipated and tympanitic. Some prefer saline purgatives, others mercurials, and others, again, castor oil, or rhubarb. Emetics are sometimes very useful at the commencement of the attack, when the tongue is loaded, and the mouth bitter, &c., and ipecacuanha answers better than tartar emetic, because it causes less depression.

During the second and third stage, counter-irritation produces very good effects, and it may be effected by dry cupping, rubefacient liniments to the abdomen, or by blisters, which answer much better. M. Barrier observes that "their action is double, at once revulsive and excitant; the first is useful when there is any indication of local congestion or inflammation, as of the chest or head, and above all, when antiphlogistics are insufficient or counter-indicated. Their stimulant action, on the other hand, is valuable when there is much prostration. In other circumstances they may be injurious; when there is much agitation, delirium, or other symptoms of excitement, we find that they rather aggravate this condition."

Diaphoretic, diuretic, and soothing remedies are of use, and may be continued in moderate doses until the disease begins to decline. Sedatives also are beneficial in the first and second stages, especially when there is much disturbance of the nervous and circulating systems. A combination of gray powder with James's and Dover's powder will sometimes act remarkably well, or if there be restlessness, sleeplessness, and delirium, we may try a combination of tartar emetic and opium, in small doses, as recommended by Dr. Graves in the typhus of adults. Cold affusion has been strongly recommended by MM. Recamier and Gendrin, but I do not think it is commonly used. It should only be used when there is excitement, with heat of surface, and a pretty strong pulse, then it calms and quiets the patient, and leads to a more healthy action of the skin.

At a certain period in the fever, but varying according to its character and the constitution of the patient, we shall find it necessary to give tonics and stimulants. When the pulse gives way, and the vital powers show signs of yielding, is our time to interfere, which may be done by some bitter infusion of bark, cascarilla, orange-peel, with ammonia or ether. These may be given freely, according to the condition of the patient and their effects. But in most cases we shall

also find it advantageous to give wine in water, whey, or arrowroot, and in such quantities as the case may demand. One of the nicest points in practice is to discover and to seize the time for the exhibition of tonics and stimulants, and one of the most gratifying to witness is the almost magical effect of the remedies thus applied at the right moment. Some writers have latterly recommended large doses of the sulphate of quinine in typhoid fever, but it is as yet extremely doubtful whether the results are likely to be as favorable as is expected.

Of course, some variation and modification will be required if any of the complications I have mentioned should take place. They will rarely require antiphlogistic remedies, because the patient is rarely in a condition to bear them. Counter-irritation by blisters to the head or chest, pushing the mercury a little further, as in cases of pneumonia, the exhibition of small doses of tartar emetic, if the patient can bear it, are pretty nearly all the means at our command.

Great attention should be paid to the hygienic condition of the patient. He should lie in a well-ventilated but warm room, lightly and comfortably clothed, with the observance of scrupulous cleanliness. His food and drinks must be of the mildest, lightest character. Water, milk, panada, arrowroot, &c. will be sufficient until an advanced stage of the disease, or the character of the symptoms demands a change.

During convalescence, also, great care and watchfulness must be observed. The patient is very liable to relapses and to various complications which are, of course, much more dangerous in his weakened condition. As soon as he has sufficient strength, he should be removed to the country, and allowed to be much in the open air, but guarded from cold.

SECTION VIII.

INFANTILE SYPHILIS.

VERY few of the diseases to which infants are liable, possess greater interest, and in some points none are of greater consequence than the syphilitic affections of infancy. "Whether we inquire into the circumstances under which the diseased parent or parents can infect their offspring, or the form in which the disease affects the infant, or the appearance and nature of those diseases which are communicated by the infant to the nurse, or of those communicated to its other attendants, and the further propagation of the disease by the nurse to her husband, and perhaps to a large family of children—I say, in investigating any one of these points, we must be struck with the fact that we find, in each, a striking deviation from those laws which regulate the venereal disease, as communicated by the adult to the adult."*

But, moreover, in this question is frequently involved the peace of families, and upon the correctness of our diagnosis may depend the happiness of married life. If we hastily pronounce a child to be syphilitic, we may sow distrust and suspicion between the parents, the fruit of which may be life-long misery, and on the other hand, a declaration that the affection is not syphilitic may lead to the direct communication of the disease to the mother or nurse, and indirectly to the rest of the family. Not merely, therefore, as a scientific matter, but really as a

* Colles, Pract. Obs. on the Venereal Disease, p. 262.

question of social morality, the subject is deserving of the most careful and thorough investigation. All our caution and all our observation will be little enough to enable us to estimate justly the history, symptoms, course, &c. of these cases with anything like a certainty of arriving at a correct conclusion.

Symptoms.—There has been a difference of opinion as to whether the *fœtus in utero* could be the subject of syphilis, even though some authors admit that the disease in the mother may cause abortion or premature labor, and they either deny that the appearances observed upon the infant at birth were syphilitic, or they attribute them to the child having come in contact with a venereal ulcer of the vagina. Mr. Colles considers this latter supposition to have been effectually refuted by cases in which no such ulcers existed at the time of parturition, and by the fact of the symptoms in the infant being present at the moment of birth. The evidence of facts, appears to me too strong to admit of our holding that opinion; not only have we well marked cases on record, but even in the more obscure cases, traces may often be detected, and the success of treatment will often clear up the difficulty altogether.

1. I shall first notice the disease occurring in utero and showing itself in *infants at birth*.

I have already mentioned that syphilis in the mother is admitted as a cause of abortion or premature labor, but we are, I believe, indebted to the late Dr. Beatty of Dublin, for the knowledge of the fact that in many cases, when no venereal taint was suspected in either parent, but when the mother has repeatedly born dead and putrid children, the true cause was a syphilitic taint, and the cure, the administration of mercury. Mr. Colles has described these cases with his usual fidelity. "The father of the child has had primary symptoms, six or eight months before his marriage; for these he had been treated by mercury; has undergone a full course of this medicine, under which his symptoms have been removed, and his surgeon has declared himself satisfied with the treatment, and dismissed him as perfectly cured. In six or eight months after this treatment he marries. In the ordinary time his wife becomes pregnant, and carries the child until the seventh or eighth month, when abortion takes place, and this without being preceded by any of those circumstances which ordinarily contribute to its occurrence. The same fatality attends on the second, and third, and perhaps on the fourth pregnancy, in spite of every attention paid to the directions of her accoucheur. At length the suspicion arises in the mind of the accoucheur: he examines the product of the next abortion, and finds that the cuticle is loose, and that it readily peels off in patches of greater or less extent: thus is explained what the midwife had termed a putrid state of the child; he may find too that the nails are not formed, and in general that the child appears as if it had been badly nourished. It should be here remarked that sometimes the child is born alive, in such a weakly and emaciated state that it does not

survive more than a few hours, and such often bear unequivocal marks of the venereal disease. Until these repeated abortions have attracted the attention of the accoucheur, there has not been any one circumstance which could have raised his suspicion as to the true cause of them; for both parents continue, all this time, to live in the enjoyment of perfect health—no trace of disease is to be discovered in either. When the husband is questioned, he candidly avows that he had, before marriage, been affected with primary symptoms; that he had been (as he thought) cured of them, and that having allowed six or eight months to elapse before his marriage without perceiving any sign of a return of the disease, he had concluded that it had been perfectly eradicated from his system. On further inquiry it is ascertained that his wife had never complained of any sensations which might lead even to a suspicion of her having had primary symptoms, nor has any appearance taken place in her which can even bear a resemblance to secondary symptoms. In a word, both parents are pronounced (after the most minute investigation) to be in the enjoyment of perfect health. In some cases we may discover equivocal appearances of disease in the father, yet so faintly resembling syphilitic symptoms that we could not think of considering them as venereal, unless our suspicions came to be strengthened by some collateral circumstances.* Such cases are related by Mr. Hey, M. Cazenave, and Dr. Whitehead.

Cases of this kind attracted the attention of Dr. Beatty, and he was led to infer that they were caused by venereal influence, and were probably to be remedied by mercury, and a trial confirmed his conclusions. "Several similar cases," he observes, after relating his first case, "occurred to me from that time with similar success, which I shall pass over, as they rest only on my own experience, and shall therefore confine myself to a very few in which I was assisted by Mr. Colles and Mr. Todd, in their capacity of surgeons. In my note book, to which I have referred, I find that in August, 1812, I attended the wife of a stay-maker, who was delivered of a putrid child in the seventh or eighth month, which she said was the third that she had borne dead. I discovered so much of venereal affection as to recommend that they should put themselves under the care of some experienced surgeon for the use of mercury. They applied to Mr. Colles, and when she was pregnant in the following year, Mr. Colles told me that they had not continued a sufficient time under his directions to satisfy him that they were cured of the venereal complaint, which I found to be the case in July, 1813, when I again delivered her of a putrid child in the eighth month. I then declared that I never would attend her again until Mr. Colles told me he was satisfied with the result of the mercury used. They again returned to him, and fully attending to his directions, in Oct.,

* Pract. Observations on the Venereal Disease, p. 266.

1814, I again attended her, when she bore a living girl at the full period of gestation. She has had several living children since."*

Drs. Campbell,† Strange,‡ and Egan,§ Drs. Coley,|| Snow, Lloyd, Wade, &c., confirm the view taken by Dr. Beatty and Mr. Colles both as to the character, cause, and cure of this class of premature putrid births. M. Danyau took a similar view, in a recent discussion at the Académie de Médecine, and mentioned that he had succeeded in putting a stop to abortion by means of mercury.¶ M. Dubois stated that of the infants born dead in hospital some offered evidences of syphilis; others who did not, were born of syphilitic parents, and that this was sufficient to justify mercurial treatment.** Dr. West speaks of abortion being frequent, owing to a syphilitic taint, but states that he has never seen an infant at birth with evident marks of syphilis.†† Dr. Condie believes that the infant may be affected in utero.‡‡

On the other hand, Mr. Acton, following the French authorities in most points, although he admits that syphilis in the mother may cause abortion, does not think it frequent. 1, because of its rarity in the venereal hospitals in Paris; and 2, because women so affected often go to the full term, and bring forth healthy children. The first of these statements is not quite in accordance with general experience, and granting the latter to be true, it proves nothing as to the occurrence in question.

After examining carefully what has been the experience of others, and comparing it with my own, I can have no hesitation in concluding that syphilitic disease, even when not well marked, in either parent, may cause abortion or premature labor, and that in the majority of such cases the infant is born dead and putrid, with the cuticle torn and easily peeled off. But are we then to conclude this appearance in an infant is of itself a proof of venereal taint? This is a very important question. We know that when a child is retained in utero for some time after death, a process of decomposition takes place, and the result is a change of color and a moist loosening of the cuticle. Now if we compare the two children born under these circumstances, one of whom we know to be born of syphilitic parents, and the other of parents unquestionably free from all taint, we shall, I believe, find it quite impossible to distinguish them, and to decide which is syphilitic and which free from the disease. If this be true, we must conclude that no infer-

* Trans. of the College of Phys. in Ireland, vol. iv. p. 32.

† Northern Journal of Medicine, May, 1844.

‡ Ibid., September, 1844.

§ Med. Press, March 25, 1851. Dublin Journal, vol. i. p. 335.

|| Diseases of Children, p. 458.

¶ Archives Gén. de Médecine, Aug., 1851.

** Gaz. Méd. de Paris, 3rd series, vol. v. p. 392.

†† Diseases of Infancy and Childhood, p. 448.

‡‡ Diseases of Children, p. 564.

ence can be drawn from the appearance of the child alone, but that we must also investigate the condition of the parents, remembering that very slight evidence of previous disease is sufficient to guide us in the treatment of these cases as syphilitic.

It is possible, however, that the infant may be born alive, but so weak that it dies in a few hours or days. In such cases the evidence of syphilitic disease is often very plain: the skin is loose, bagged, and shrivelled, the face has an old withered expression, and there is a copper-colored eruption about the anus and genitals, and in some cases over the whole body. An experienced friend of mine assures me that he has seen slight ulceration at the corners of the mouth and margin of the anus in such cases. It is right to state that M. Bertin, during ten years at the Hôpital des Vénériens, had but few cases born with marks of syphilis. Dr. Condie mentions that he has known the infants of diseased parents, when born, to present regular ulcerations or large vesications on different parts of the surface, filled with a yellow, turbid, or dark colored fluid, and which, upon rupturing, left ulcerations of the skin that became quickly covered with thin dark-colored crusts, and surrounded with a dark red or purplish margin.* M. Gilbert mentions that he has seen vesicles, or papulæ, or tubercles, upon the buttocks and genitals, but never the large blisters of pemphigus which M. Depaul has described. M. Dubois regards the pemphigus which is characterized by large blisters filled with a deep yellow pus, developed upon the palms of the hands and soles of the feet, and with the skin underneath of a bluish or violet color, as being undoubtedly syphilitic. M. Ricord has frequently noticed syphilitic pemphigus as well as smaller vesications. John Hunter mentions having seen a child which exhibited venereal pustules at birth.

Dr. Depaul, of Paris, has recently read a paper on certain changes in the lungs of syphilitic children, which had been noticed by Baron, Billard, Husson, &c., but which he believes to be peculiar to these cases. "In fifteen cases the lungs were more or less studded with small nodules composed of dense grey tissue, having a central cavity filled with sero-purulent fluid. In most cases the infants had also pemphigus, purulent deposits in the thymus gland, or enlargement of the liver, and death occurred shortly after birth; one or both of the parents were known to have had syphilis."† In the discussion which took place at the Académie de Médecine, M. Cazeaux, the reporter, regarded the abscesses in the lungs as nodules of pneumonia, the pemphigus and abscess of the thymus as not necessarily syphilitic. MM. Gibert and Roux agreed with him. MM. Moreau and Danyau approved of treating these cases as syphilitic. MM. Dubois and Ricord considered that the state of the lungs might result from syphilis, but

* Diseases of Children, p. 566.

† Medical Times, July 19, 1851.

that abscess of the thymus gland and the pemphigus were very characteristic of the disease. From the equal balance of authorities, it is clear that more observation is necessary to establish the accuracy of M. Depaul's conclusions.

2. *Syphilis appearing after Birth*.—In the greater number of cases the symptoms of the disease do not make their appearance until a week or more after birth; nay, it is said that this period may be extended to two, three, or six months. M. Rizzi states that of fifty-five infants, the disease manifested itself one month after birth in thirty-three, at the expiration of two months in eleven, of three months in four, of four months in four, and in one only at the expiration of eight months.*

The child is born apparently healthy and well nourished, but after a time a number of copper-colored spots appear about the anus or genitals, and on the inside of the thighs, sometimes spreading over the loins and degenerating into ulcers. The infant is also attacked by snuffles; there is an acrid discharge from the nostrils, which irritates the parts, and, drying, forms a crust which obstructs the nostrils and interferes with respiration. The voice is changed in character; it loses its clear tones and becomes rough, whispering, and raucous. Superficial ulcers appear at the angles of the mouth, sometimes of the mucous membrane, sometimes of the skin, which cracks and bleeds. Occasionally the tongue, palate, and throat are covered with superficial ulcers. Sometimes there is a slight muco-purulent discharge from the eyes, with redness of the tunica conjunctiva.

If the disease be not arrested, we may have ulcers or fissures in different folds of the skin, for instance in the folds between the chin and throat, in the folds of the thighs, &c. The glands may become enlarged, those of the neck and occiput when there is much eruption on the head, and others in different parts, but as Mr. Colles remarks, they are very different from buboes in the adult; there is little active inflammation, although some of them occasionally suppurate and ulcerate slowly.† The child rapidly emaciates, the skin becomes loose and flabby, the countenance has a worn, wrinkled, and old expression, the strength is exhausted, and after an uncertain interval it perishes in a state of marasmus. The duration varies a good deal: in some cases death takes place in a short time, but in others, the majority run on for weeks and months, until the child is utterly worn out.

Such is the general course and symptoms of the disease, but from these there are many deviations. Often only a portion of these symptoms are present, or the order in which they appear may vary. Sometimes the snuffles and hoarseness appear first, followed by the eruption about the anus and nates, but more generally the reverse.

* Gaz. Méd. de Paris, Oct. 24, 1846.

† Berton, Mal. Vén., p. 74.

Now and then no other indication of syphilis appears (than the snuffling), but nevertheless the coryza does not yield until after the child has been brought under the influence of mercurial remedies, a fact which would seem to show that, although unaccompanied with other signs of venereal taint, the snuffles of young infants are produced by that cause.

At an advanced stage, pustules may form about the mouth, especially about the lower lip and chin, which destroy the cutis, and leave the surface after they have healed, much scarred by their cicatrices. Or, according to Mr. Acton, "the corner of the child's lips may become covered with condylomata, and have great tendency to crack, forming syphilitic psoriasis labialis, or the papules are noticed covered with successive scales, which falling off, present a raw excoriated surface, and are very difficult of cure, as the cicatrices tear whenever the child sucks. The tongue is sprinkled over with white spots as large as split peas, and have the appearance as if its surface had been touched and whitened with caustic; this appearance extends to the throat, and probably to the intestines, producing diarrhœa or mucous and sanguinolent discharges. The German writers have examined these secretions from the lips and mouth, and state that they contain cryptogamic plants; hence their belief in the contagiousness of these complaints."* M. Berton mentions the existence of phlyctenæ, which burst, and are followed by ulceration of the cutis, which he calls chancre or chancrous ulcer.† They may occur on the skin, or in the mouth, or about the anus.

The red eruption about the anus and buttocks may not be limited to a mere redness, but may assume the form of large moist papules, forming condylomata. "These mucous tubercles are very characteristic, in size equal to a split pea, sometimes distinct, in other instances confluent, elevated above the surrounding skin, which is of the color of boiled ham, in parts dry on their surface, and becoming scaly, in other places moist, and secreting a fetid discharge, which excoriates the surrounding surface, producing erythema, eczema and psoriasis of the hands and feet, which presently crack and cause great pain to the child, &c."‡

Mr. Hey and Dr. West also mention this peculiar exfoliation of the epidermis of the extremities. "The epidermis," the latter observes, "in some bad cases peels off the hands and feet; it generally becomes thickened to a kind of crust, like that which forms on the hands in psoriasis, and then cracking falls off in patches, leaving the skin fissured, and sometimes deeply ulcerated at the bend of the wrist, or at the flexures of the fingers and toes. The new and delicate epider-

* Diseases of the Urinary and Generative Organs, p. 612.

† Mal. Vén. chez les Nouv.-nés, p. 56.

‡ Diseases of the Organs of Generation, p. 612.

mis in its turn undergoes a similar thickening, and becoming detached in the same manner, or else it continues white and thin, but shrivelled, and looking like the sodden and wrinkled skin of a washerwoman's hand, and peeling off in little fragments, leaves the cutis, especially at the tips of the fingers and toes, red and bleeding slightly even on the gentlest touch."*

It is very seldom that severe ulceration takes place, as in the adult, by which the bones of the nose or palate are destroyed; so rare is it that Mr. Colles states that he never met with a case. Dr. West mentions that he has seen one instance of destruction of the bony palate; and Mr. Acton that he has seen the ossa nasi fall in from ulceration.

M. Berton, in his very valuable work, states that he has observed bony tumours and periostosis in infants attacked with syphilis, but they are extremely rare.†

Causes.—That the disease is always communicated to the infant is, of course, undoubted, but the mode may vary. It may be derived either from the parents, or from the wet-nurse, or, perhaps, from a dry-nurse. A few remarks upon each mode will not be out of place.

1.—*Hereditary Syphilis.*—*a.* As we have already seen, an infant may be born syphilitic whose father had the disease some considerable time before marriage, but who at the time of marriage and since has been either apparently free from the disease, or in whom the symptoms have been too slight, or too doubtful to give rise to suspicion.

b. If the father contract syphilis and communicate it to his wife, and she conceive, the child will also be contaminated.

c. The mother and father may both be healthy at the time of impregnation and for some time after, and yet if either contract syphilis the child may be affected. Mr. Porter relates a case in which the father became diseased about the third month of his wife's pregnancy, and shortly before her confinement several spots resembling button scurvy appeared, but nothing more. The child died syphilitic in a week after its birth. Mr. Porter remarks: "Now, this infant had been begotten in April, three months before the father's first contraction of the ailment, and must, therefore, have been poisoned by the circulation of the mother at a considerable period subsequently. The question is, how did that circulation become contaminated, seeing that the father had never a sore capable of furnishing a drop of matter, and the mother never a symptom of any description, until the doubtful one of button scurvy, which only appeared a few days before her confinement."‡ Mr. Whitehead, in his recent work, relates analogous cases. He adds that such cases have led him to the conclusion that "the semen of a diseased man, deposited in the vagina of a healthy woman,

* Dis. of Infancy and Childhood, p. 450.

† Mal. Vén chez les Nouveaux-nés, p. 89.

‡ Dublin Med. Press, Feb. 17, 1847, p. 110.

by *being absorbed*, may contaminate that woman without the necessary occurrence of a chancre, or any open sore secreting matter in either the man or the woman."

d. But it appears that we may go a step further and conclude that a diseased father may transmit the disease to the infant without the mother being affected at all. Some have doubted the possibility of this, and some have admitted it with hesitation. M. Bertin and Mr. Whitehead, and M. Vidal de Cassis distinctly maintain this doctrine, and quote cases.* More recently, Mr. Parker, of Birmingham, has given one and Mr. Acton three such cases, in which this appears to have been the case, and the latter observes: "We may, then, I think, lay it down as a rule, that a father labouring under secondary symptoms, will contaminate the ova which he impregnates, although his wife remain perfectly healthy; and it is an error to suppose that a husband labouring under secondary symptoms will first infect his wife, and through her the embryo."† Dr. West's experience confirms this: he states that "cases are now and then met with in which the venereal taint appears to have been derived entirely from the father, the mother, as far as can be ascertained, not having suffered at any time either from primary or secondary symptoms, although she has given birth to an infant affected with all the characteristic marks of syphilitic disease."

e. M. Vidal de Cassis goes further still, and states that he saw a case in which a husband contracted syphilis, and infected the infant, but not the mother. The husband died and the mother married again, and conceived; but although both parents were apparently healthy, the infant was born syphilitic.‡

2. *Derived from the Wet-nurse.*—I do not myself feel the least doubt that an infant may contract the disease from a wet-nurse affected with secondary symptoms; and this opinion, which was held by De Hery, Boërhaave, Levret, Hey, and others very eminent, is, I believe, in accordance with that of the profession in this country at least. Mr. Colles remarks: "There is still another manner in which the infant may receive the infection, viz.: by sucking a nurse affected with secondary symptoms of syphilis, but I am in doubt whether the diseased nurse could infect the child unless she had ulceration of the nipples, and I cannot at this moment recollect an instance."§ This coincides with the remark of Swediaur, that "in all cases of the kind that had come to his knowledge, either the nipples of the nurse were infected with syphilitic ulcers in the mouth of the child, or reciprocally, the nipples of the nurse being attacked with ulcers, occasioned

* Mal. Vén., p. 168.

† Diseases of the Organs of Generation, p. 624.

‡ Traité des Mal. Vénériens, p. 509.

§ On the Venereal Disease, p. 271.

ulcers of the same kind in the mouth, nose, and lips of the child, and thus communicated to it a general infection."* M. Cazenave, whose eminence as a syphilographer is admitted, has met with a number of cases of this kind, and fully believes in this mode of transmission. Dr. West admits the fact, but states that it is an unusual occurrence. Dr. Egan, whose experience in the Lock Hospital has been very considerable, entertains no doubt of this mode of infection, and coincides with Mr. Colles that ulceration of the nipple is essential.† Mr. Whitehead maintains this doctrine very strongly, adducing six cases, and does not think it necessary that there should be any abrasion of the nipple.‡ He has also brought forward evidence from many authorities which it would be difficult to gainsay. MM. Cazenave and Vidal de Cassis also hold this opinion, the latter believing that the milk is the vehicle by which the poison is conveyed to the child, and he cites the case of a healthy nurse suckling a healthy child, but who gave suck to a syphilitic child, was infected by it, and communicated the disease to the first child. I saw a case exactly similar myself, in which the casual suckling of a diseased child as an act of kindness, infected both the nurse and her proper nursling.

On the other hand, Mr. Acton does not believe that a diseased nurse can communicate the disease to the infant, and he quotes the authority of M. Ricord to the same effect.§ At the same time it must be observed that the only argument he uses is a negative one, viz: that nurses laboring under syphilis have suckled children without communicating the disease. No one doubts this, but it does not prove that a child cannot so derive the disease. It may be that none of these nurses had ulcerated nipples, and at any rate they may be merely exceptions. Very recently M. Cullerier, jun. has maintained the same opinion, and chiefly supported by the same negative proofs.||

Some writers, and among the more recent Mr. Lane and Mr. Parker, consider that the milk of a diseased nurse is capable of conveying infection, but this appears to be a doubtful point, although MM. Ricord and Vidal seem to admit it; thus coinciding with the opinion of Colombier, Doublet, and Faguer, and contrary to the opinion of John Hunter.

M. Bertin gives a case of a child of three years old, who was infected by its mother, to show that contact with the lips of an infected person may communicate the disease.¶

3. *From the Dry-nurse.*—It would seem further to be possible

* On Syphilis, vol. ii. p. 14.

† Dublin Journal, N. S. vol. i. p. 334.

‡ On Hereditary Diseases, p. 222.

§ Diseases of the Organs of Generation, p. 628.

|| Gaz. Méd. de Paris, 3e série, vol. v. p. 892.

¶ Mal. Vénér. chez les Nouveaux-nés, p. 27.

that the child may derive the disease from a dry-nurse or an attendant. Mr. Colles relates a case in which the child was contaminated by the cook, and in turn communicated the disease to its dry nurse, and he remarks: "Here, then, are two examples to establish the opinion that secondary symptoms are capable of propagating the venereal disease, for in this case no suspicion whatever arose in the minds of any of the medical attendants that the disease of the child had been derived from the parents; indeed the advanced age of the child at the time that it first exhibited any signs of the disease, was quite sufficient to remove all doubt or suspicion on that head.*

Consequences.—Although it is scarcely within the strict limits of this work, yet the history of this disease would be so incomplete without some notice of the reciprocal influence of a syphilitic infant upon the nurse, parents, &c., that I am induced to mention briefly the principal consequences.

1. M. Ricord believes that a woman quite free from disease herself, but carrying a diseased ovum, may become diseased through the medium of the foetus, and not by the father. Mr. Acton has seen but one such case.† Mr. Hutchinson has recently maintained the same opinion.‡

2. Mr. Colles notices a curious fact which has been confirmed by Dr. Egan and others, viz: that he had "never seen or heard of a single instance in which a syphilitic infant (although its mouth be ulcerated), suckled by its own mother, had produced ulceration of her breasts, whereas very few instances have occurred where a syphilitic infant had not infected a strange hired wet-nurse, and who had previously been in good health."

3. That the child may communicate the infection to the nurse, is, I think, generally admitted by the most experienced practitioners, though there may be some difference as to the conditions. I lately saw a case in which the child derived the disease from one wet-nurse and communicated it to another, who infected her husband. Whether it is essential that there should be a breach of surface in the nipple, it is difficult to pronounce absolutely. Swediaur considers it essential that there should be ulcers of the mouth. Dr. Egan states that a nurse may suckle a diseased infant with perfect safety so long as no abrasion of the cuticle, or ulceration in or about the nipple occurs, but that then she is no longer safe, and to this rule he has not met with a single exception.§ In France, Doublet and Bertin have given it as their opinion that a child may infect its wet-nurse, and more recently M. Bouchut has published cases to prove it. He

* On the Venereal Disease, p. 275.

† On Diseases of the Organs of Generation, p. 619.

‡ Medical Times and Gazette, Oct. 11, 1856.

§ Dublin Journal, N. S., vol. i. p. 346.

states that no one doubts that a child acquiring syphilis from another person can communicate it to its wet-nurse, but the doubt has been whether congenital hereditary syphilis is thus transmissible.* Cases of this kind have also been recorded by Lallemand, Drs. King, Mac-night and Price.† M. Rizzi, of Milan, not only entertains this opinion, but has furnished statistics of the comparative frequency of the symptoms presented by the nurse who has contracted specific ulceration of the breast from suckling an infected infant.

On the other hand, some high authorities are doubtful. Mr. Pearson states that he has not been able to arrive at absolute conclusions, but he does not appear to me to deny the possibility, and some instances he mentions seem to support the affirmative.‡ Trousseau hesitatingly remarks: "Do not observations exist which lead to the belief that these local lesions (fissures of the lips) are transmitted to the nurse by direct inoculation, and produce in her alterations of the same kind, sometimes so severe as to destroy the point of the nipple."§ MM. Ricord and Cullerier,|| and after him Mr. Acton, entirely deny that venereal can be thus communicated, and he explains or reasons away all the instances adduced either as not being specific, or if so, that the nurse has contracted syphilis in the ordinary way but conceals or denies it. That a sore mouth (aphthæ) in the child, may occasion a *sore nipple we know*, and that this may possibly be mistaken, but this really proves nothing against more carefully observed cases, and the latter statement is an assumption which puts a stop to all argument, and may be applied to disprove almost anything. But we do not know that aphthæ will occasion a train of constitutional affections, as rashes on the skin, ulcers in the throat, otitis and periostitis, which the local infection from the mouth of a syphilitic child causes. For myself, I cannot doubt, from the experience of others and my own, that a diseased child may infect the wet-nurse. I am not prepared to say positively whether abrasion of the surface is essential, although I think it probable.

The peculiar train of symptoms to which this infection gives rise have been graphically described by Mr. Colles. "In some days, or at least in a very few weeks, after the nurse has observed the venereal symptoms appear on the child, her sufferings commence. She is at first affected with what she terms a sore nipple. On inquiry it will be found that one or two pimples or pustules have appeared near the nipple; these soon degenerate into an ulcer, which presents the characters of a secondary rather than a primary venereal ulcer; this

* Gaz. Méd. de Paris, 3e série, vol. v. p. 296.

† Med. Times, vol. xii. p. 81, 176, 422.

‡ MS. Lectures, p. 83.

§ Archives Gén. de Méd., vol. xv. p. 165.

|| Gazette Méd. de Paris, 3e série, vol. v. p. 892.

becomes exquisitely sensitive. A slight enlargement and tenderness of some of the axillary glands quickly follow, but these glands do not betray any strong tendency to run into suppuration; on the contrary, I must say that I have not seen one single instance in which this occurred. In two or three weeks more the nurse complains of sore throat, or of an eruption, and not unfrequently these two symptoms appear almost simultaneously. An eye accustomed to view the secondary symptoms of syphilis does not discover any difference between these and the venereal sore throat and eruption which follow a primary ulcer in the adult. The pudenda of the infected nurse are very generally beset with small raised ulcers which discharge copiously—these are to be seen, perhaps, in every case where a general eruption of the skin exists, but not unfrequently they may be found accompanying the superficial white ulceration of the throat, where no general eruption exists, and when the skin remains free from a general venereal eruption. I have occasionally seen venereal iritis also attack the nurse. What other symptoms might arise, or what course the disease might follow if longer unattended to, I cannot pretend to say, because I have scarcely ever seen any case in which the course of symptoms might not have been disturbed and deranged by the exhibition of mercury. But many of those nurses to whom mercury was administered became affected with very obstinate ulcerations of the throat, and with pains of the bones and joints.”*

In M. Rizzi's able report of the Milan Hospital it is stated that of 100 women with chancres in the breast, from impure lactation, or in the mouth and throat, derived from contact with an infected infant, 34 had tubercles of the vulva, 19 syphilitic angina, 2 iritis, 14 tubercles of the vulva and angina simultaneously, 5 tubercles of the vulva, and others disseminated over other parts of the body, 6 tubercles of the vulva, angina, tubercles of the skin and iritis, and 19 no secondary symptoms.

4. But the evil may not stop here; the nurse thus infected may communicate the disease to her husband; for according to Mr. Colles, and no higher authority do I know, he “may become affected with ulcerations on the genitals, and these in a short time are attended by superficial ulcerations of the throat and mouth. If we have an opportunity of examining the nurse at the time her husband first complained of ulceration of the genitals, we shall find a greater or smaller number of small, raspberry like, moist, raised excrescences, or as some term them, ulcers on the genitals, and inside of the top of the thighs of the nurse, and this while there is no eruption on the general surface of the skin, &c. This opinion is confirmed by the great experience of M. Rizzi in the manner already referred to.

5. In this melancholy history there is yet a further step; not only

* On the Venereal Disease, p. 233.

may the infant infect the nurse, and through her her husband, but it is possible that the contamination may be extended to any, or all the members of her family, and in the following manner: "If we suppose, as frequently happens, that the child is suckled in the house of the wet-nurse, and that she has a numerous family of children, to one of her daughters (more particularly) is assigned the care of dressing and carrying about this infant—this is the child that first suffers from the contamination. The whole family being completely ignorant of the nature of this disease, the girl sleeps as usual with the rest of her brothers and sisters—for among the lower order of Irish, that family is considered to be in comfortable circumstances, which can afford a separate bed for the parents, while all their numerous progeny are huddled together in another bed—the discharge from the ulcers about the anus and vagina coming in contact with one of her brothers or sisters will produce a similar ulcer on those persons, and in this manner, obviously, a number of the family contract the disease." Mr. Colles adduces cases in support of this view.

Diagnosis.—In many cases the diagnosis is environed with greater difficulties than the treatment, for although an experienced eye will in general arrive at a correct conclusion, there are cases in which it is almost impossible to pronounce positively. No caution can be too great where such serious consequences are involved.

I. *Congenital Syphilis.*—1. In such cases as Dr. Beatty has described, and in which the fœtus is born dead and putrid, I have already stated my belief that the appearance of the child, the altered color, the loose cuticle, &c. are not sufficient alone to enable us to pronounce the case to be venereal; but if we can make out any trace of syphilis, in either parent, or even the occurrence of the disease in the father before marriage, I think that then the repeated births of dead and putrid children may fairly be supposed to arise from this cause.

2. But the child may be born alive, and die almost immediately; exhibiting an eruption of papules, vesicles, or pemphigus. Even in these cases we should, perhaps, not be satisfied without some evidence to show that one parent had had some form of venereal. Ulcerations at the angles of the mouth, or about the anus, are strong additional evidence of a syphilitic taint, though not absolute proof. M. Dubois, and more recently, M. Depaul, have laid some stress upon abscess of the thymus gland, as characteristic of syphilis in new-born children, and the latter has further supposed a species of abscess of the lungs as equally valuable, but I fear that we have not as yet a sufficient number of observations to establish the fact.

II. *Syphilis developed after Birth.*—Dr. Bird remarks that "there is seldom any real difficulty in the diagnosis of these cases, when once the practitioner has learned to recognize them. The characteristic snuffling will often enable him to recognize the existence of disease even before he has confirmed his opinion by visual examination. The puckered mouth, the position of the very characteristic eruption around the

lips and anus, in addition to the peculiar varnished and fissured appearance of the parts from which the scales have faded, will seldom, if ever, fail to convert a suspicion of the true nature of the disease into positive certainty.”* Doubtless, as in other diseases, we have a concurrence of different symptoms, the case may be clear enough, but this does not prove that any one or two symptoms are pathognomonic. In the careful estimate of these symptoms, and in the judgment formed of them collectively will consist the accuracy of our diagnosis. “We sometimes meet with an infant having numerous spots of moist button scurvy about the anus, genitals and inside of the thighs. Should other members also, of the family, exhibit similar symptoms, we are not in much danger of mistaking them for syphilis, because a slight attention to the history of each case, and to the marked difference in the more grown subjects, between button scurvy and syphilis will alone enable us to decide; but where the infant is the only member of the family so affected, we are liable to commit a mistake, if we form a hasty opinion. A little attention will enable us to decide correctly, for although the anus and external organs of generation may present appearances pretty closely resembling those of syphilis, yet we shall be able to distinguish them from the latter, by observing that they are raised above the surface, that they are most distinct and distant from each other, while those in syphilis begin with a number of blotches pretty thickly set, then enlarge a little and then ulcerate, without being at any time raised above the sound skin. An eruption of copper-colored spots is not unfrequently seen about the anus and genitals of infants, otherwise perfectly healthy—these we must not hastily pronounce to be venereal; they are sometimes caused by inattention to cleanliness, and sometimes by a disordered state of the alimentary canal. But these spots remain the single symptom; this disease is not found to make progress; it does not show itself in the mouth or throat, or on other parts of the body, and it soon yields to persevering cleanliness, and a regulated condition of the alimentary canal. The anus of infants is subject to fissure, which, beginning on the skin, extends in upon the mucous membrane of the rectum. We know that such is not venereal when we find it remain a single solitary symptom; this yields to black-wash and ordinary local treatment. A superficial ulcer is sometimes found on the rugous skin of the anus; generally with one part of the edge rather deep, the rest of the edge thin. This ulcer is not very painful, it is indolent, and sometimes continues for many weeks or months, the general health of the child remaining unimpaired. Strict attention to keeping this ulcer constantly covered with some stimulating application will effect its cure in a very moderate space of time.”† M. Trousseau states that he depends

* Guy's Hospital Reports, 2e série, April, 1845.

† Colles on Venereal Disease, p. 275.

greatly in forming his diagnosis upon the peculiar yellow color of the skin, which he thinks of more value than the copper color of the eruption. He places great value on the cracks which appear on the hands and feet, and considers them rarely deceptive when present, which he admits is not always the case; and lastly, the combination of several syphilitic symptoms occurring at the same time.*

I think, then, that we may conclude that although one symptom may have a greater value than another, yet that any one alone is not sufficient to decide the question; nay, that each symptom has its analogue in non-syphilitic cases; but that when several co-exist, and in proportion to their number, we shall find no difficulty in arriving at a correct conclusion. Thus, if there be a spreading copper-colored eruption, a yellow skin, ulceration of the angles of the mouth and anus, snuffles, fissures of the skin, &c., the case may justly be assumed to be syphilitic, and, of course, if due care be taken, the history and condition of the parents or wet-nurse will form a valuable help to us in forming our opinion.†

Prognosis.—I have already mentioned that generally, if remedies be not applied, the child dies after a shorter or longer interval, sometimes in a few days. But if proper treatment be applied early, and the child be not very deeply contaminated, we may hope to save a considerable number. A statistical paper was recently read by Mr. Acton to the Medical Chirurgical Society, June 9th, from which it appears that the greatest mortality from syphilis is in children under one year.‡

Treatment.—I shall first speak of the treatment of those cases where repeated abortions of dead children have occurred, and I must differ entirely from MM. Gibert, Roux, &c., who, being doubtful as to the cause of the abortion, object to the use of mercury. Even if I doubted, or in cases in which I may still doubt whether there be any venereal taint, I should still be disposed to try mercury, simply on the ground of experience, that in similar cases it has succeeded in preventing the death and premature expulsion of the foetus. But believing, as I am compelled to do, that syphilis is the cause of this accident in many cases, I have no hesitation in saying that we ought to give our patient the benefit of our experience. Both parents ought to go through a regular course of mercury, and to abstain from cohabitation until the medical man is satisfied with its effects. We have the testimony of Dr. Beatty, Mr. Colles, Dr. Egan, and MM. Moreau, Danyau, Dubois, &c., as to its success. M. Levret considered that it was quite possible to cure an infant in utero, but the difficulty would be to know that it was affected. M. Bertin agrees that the mother may be cured of syphilis during pregnancy, and that the child will be born healthy.

* Archives Gén de Méd., vol. xv. p. 149.

† Acton on Disease of Organs of Generation, p. 640.

‡ Ranking's Abstract, vol. iv. p. 293.

Dr. Egan mentions that he succeeded in producing ptyalism in a case of this kind, in the fifth month of pregnancy, and saved the child.*

Then, as to the treatment of syphilis in any form in infants after birth, although doubtless many of the symptoms may be cured without mercury, yet I do not think it would either be satisfactory or complete. We may give hyd. c. cretâ gr. i. or ii. three times a-day, or a fraction of a grain of calomel as frequently, according to the age of the child, and this should be continued until the symptoms disappear. If the bowels are too much moved or irritated, we may combine the pulv. cretæ co. or the pulv. cretæ co. cum opio, so as to restrain them.

Mercurial inunction has been very long in use, and is of great value; it was used by Levret, Fabre, &c.; and probably Sir B. Brodie's mode of applying it by means of a flannel bandage smeared with the ung. hydrargyri will be found the most convenient. Mr. Pearson recommends that a scruple of mercurial ointment should be rubbed on the child's body nearly every day for five or six weeks. Mr. Acton states that he never gives mercury to infants, but depends upon its external application, by means of his mercurial belt, and frequent warm baths.

Of course, though we must bring the system fully under the influence of the mercury, we do not expect the usual symptoms of it in ptyalism. Mercurial purging we may have, and in most cases it is not a bad test, but the best is the gradual abatement of the disease, and if there be ulceration of the mouth, even the diminution of the salivation which already existed. The disappearance of the symptoms is not always a proof that the disease is entirely eradicated, as we find relapses not uncommon; however, they will be relieved, as before, by mercury.

The external ulcerations will require local treatment; black wash is one of the best; and if any one prove obstinate, we may advantageously change the black wash for a dressing of dilute citrine ointment, or wash it with a weak solution of nitrate of silver, or sulphate of copper. "I am not acquainted," says Mr. Colles, "with any remedy which can be with advantage applied to the ulcers of the lips, palate, and throat; the very act of applying anything to them irritates the ulcers, and causes them to bleed, so that I have imagined that they did fully as much harm as good, and on that account have long since relinquished their use altogether. I am not aware of any local treatment for the swelling of the enlarged lymphatic glands; they yield readily to the constitutional influence of mercury. The slight purulent discharge of the eyes is benefited by a mildly astringent collyrium."

All authorities are agreed that the wet-nurse should be brought under the influence of mercury, and some, Levret, Fabre, Bertin, &c.,

* Medical Press, March 26, 1851, p. 195.

have asserted that the child may be sufficiently affected by remedies given to the nurse; but this appears doubtful. Mr. Colles saw cases in which this failed, and he is decidedly of opinion that the cure of the infant will be more speedy as well as more certain if mercury be given to it at the same time as to the nurse.

After the syphilitic symptoms have disappeared, unless the child's health be completely restored, some tonic may be given, cascarilla, sarsaparilla, columba, or bark, the syrup of cinchona being the pleasantest form for young children. Dr. West speaks well of minute doses of iodide of potash in sarsaparilla, if there be no irritation of the bowels; but if the syphilitic cachexia be well marked, the syrup of the iodide of iron.

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